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Boston Edison Stock Split-up Vetoed by Commission

A DRASTIC decision denying the Edison Electric Illuminating Company of Boston the right to split its stock from $100 to $25 par focused widespread attention upon the Massachusetts Department of Public Utilities as the week opened. The finding was a surprise of the first order, and the reasons given by the board for its unprecedented action can be read in detail in our news columns, together with President Edgar's comment. In sum, the commission set forth its objections to the split-up chiefly on the grounds that the stock had attained a market price too high (recently $411 at auction) to warrant its purchase from the investment standpoint; that the company's recent increase in dividends from $12 to $13.60 per share per year was improper in view of its alleged insufficient provision for depreciation and surplus; that the split-up would raise hopes in the investor's mind which would be of doubtful realization, and that the company's rates are out of line with those of such properties as Worcester, Cambridge and Springfield. The point was also made that the split-up carries little certainty of a widened distribution of the company's shares.

Mr. Edgar's rejoinder constitutes a straightforward defense of the company's dividend, rate and financing policies. He declares that for some years the company has set aside 50 per cent more for depreciation than the commission had informally fixed; that the $13.80 dividend represents but 8 per cent on the average amount paid for their shares by stockholders against over 9 per cent by thirty of the larger gas and electric companies of the state in 1928; that in the past nineteen years during which the twelve-dollar dividend has been paid rate reductions have saved the company's customers millions of dollars; that soon (through promotional and lowered rates) only 86,000 instead of 332,000 customers will be paying the maximum rate of 8.5 cents per kilowatt-hour (including lamps), and that the Edison rates apply uniformly over 600 square miles of territory, with a decided contrast to the conditions as to density of service obtaining in the smaller cities named in the order. The average rate per residential kilowatt-hour is now about 6.6 cents. The high prices of Edison and many other utility stocks are known to reflect a nation-wide situation, and the soundness of the Boston company's securities from the investment standpoint is not in Mr. Edgar's view impaired by recent high market quotations.

The commission's entry into the field of stock market appraisals seems unfortunate. Current values expressed in stock quotations represent the integration of many intricate factors, and it is dangerous for a governmental body to pass judgment upon whether a security is "worth" this price or that at a particular time and for a particular purpose. Edison stock fell 76 points from $375 before partial recovery after the commission's pronouncement was issued. Market quotations do not represent rate bases, and we understand that the Massachusetts commission has the legal authority to initiate rate inquiries as well as to pass upon capital issues. Comparisons of metropolitan properties with small ones are likewise risky. Recurring stock rights in expanding industries bring their own reward and reconcile the present investor to regular returns far below the standards of former days. It is an open question whether the province of regulation should not exclude these aspects of utility finance from its interest. As for the advantages of reduced par value in relation to security distribution, little need be repeated at this late day.

It is hard to escape the conclusion that the Bay State commission might attain its objectives in more effective ways than by attacking the split-up of stock pars and issuing ex-cathedra opinions as to market values.

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Short-Time Rating of Oil Breakers

THERE are three things that the operating man wants to know about a breaker. First, has it sufficient rupturing capacity to break a "short" on the particular circuit? Second, is it mechanically and electrically strong enough to withstand the first impact of a short circuit before it opens? Third, how long will the breaker stand up if its opening is delayed through some defect?

Knowing the constants of the transmission lines and the characteristics of the connected electrical machinery, the engineer generally has sufficient information to answer these three questions when he has the rating of the breaker from the manufacturer. But will his

answer approximate a safe but not foolishly conservative value when determined by some accepted method? Fortunately, the rupturing capacity of oil breakers is now standardized and well known. Not so with the short time rating.

The short-time current-carrying capacity depends upon two things—maximum allowable electromagnetic stress and maximum allowable heating. Both these items are functions of the square of the current as well as other factors. Since high-voltage breakers are comparatively lower in current rating, their rupturing capacity alone will generally be the limiting feature. A knowledge of it is sufficient to make a correct choice of the kind of breaker to be purchased. This is not the case in lower-voltage heavy-current breakers. If the assumed contact resistance be varied a few hundredths of an ohm, or if possible maximum (asymmetrical) values of current be neglected during the initial rush, or even if a plausible but different decrement be used for this current, totally contradictory solutions may be reached. Manufacturers know from tests what to expect from certain breakers when operating in test circuits.

The error lies in the different methods of generalizing these data and in deducing the particular cases from the generalization. In reducing these test data to ratings some arbitrary simplifying assumptions are made. They are not always clearly stated nor are they standardized. Because of this condition calculations for heavy current breakers may lead to serious confusion.

It is high time all factors entering into the short-time rating were discussed and the existing data made generally known. If our present information is insufficient, we can at least agree to standardize on some good empirical method of calculation until we gather sufficient knowledge relative to the factors determining the short-time rating to make a uniform standardized method of calculation possible.

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Submetering Now a Menace

NEW YORK CITY has been the scene of debate over the practice of having a building owner or a commercial organization purchase energy at wholesale rates and resell it to tenants at retail rates. The series of commission hearings held earlier in the year will be resumed this fall, and the article by Prof. A. E. Knowlton in this issue summarizes the arguments pro and con in an admirable manner.

Submetering complicates the regulation of utilities greatly and puts a handicap on the full development of electric service. It is a survival of the competitive age, when apartment buildings had private plants, and has no place in the modern conception of the duties of a light and power company. Experience shows it to be in the public interest that service be rendered by a strictly regulated monopoly equipped to carry out its obligations to the full. The modern utility must sell energy and in addition must imbue customers, directly or indirectly, with the ideas and equipment needed to bring about the benefits to be derived from complete electric service.

It is unfortunate that submetering has reached the magnitude it has, because it was more or less a child of the utility industry in the early days. Every reasonable effort should be made to minimize loss from its abolishment. But it should be abolished.

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Trial Horses Hold Trade Conferences

ELECTRICAL manufacturers have been reluctant to call upon governmental agencies to help them develop trade practices. They have preferred to settle their affairs by themselves, especially as the National Electrical Manufacturers' Association is available as a clearing-house agency. But last week several of the N.E.M.A. groups held a conference with the Federal Trade Commission on trade practice rules and thus took the first step toward more intimate relations with governmental agencies. Not all manufacturers agree that this step was wise, but all are watching developments with great interest.

A survey of the rules proposed shows that any industry group could of itself adopt them as trade practice rules, and the question then arises, why go to the Federal Trade Commission? The answer is that the agreement between the commission and an industry group is a contract and the commission has the legal right to enforce the contract against any violators. This makes a much stronger trade practice enforcement situation than would result from industry group agreements.

It is a debatable proposal to ask for a trade conference. A first step may be innocent and well-intentioned but may mean a growth of governmental and business relationships that would violate the well-conceived idea that business should conduct its own affairs. In a sense it is an admission of weakness on the part of a business group. On the other hand, the Clayton and Sherman acts are difficult of interpretation, and the small manufacturer, especially, feels safer if rules are approved by the Federal Trade Commission in that it is reasonable to assume that courts would take this fact into consideration in the event that anti-trust proceedings were instituted. Some manufacturers believe, however, that semi-official rules merely stifle business growth in that they become fixed while actual conditions change, and these men prefer to rely upon industry group agreements, arrived at with the advice of counsel, for trade practice rules.

Undoubtedly, it is the best policy for industry to settle its own affairs, but the recent conference is a worth-while attempt to clarify a situation that was

chaotic. The results will be measured in terms of the good faith and moral stamina of the manufacturers who sign the final rules. It will take this, and not the police powers of the Federal Trade Commission, to bring about good trade practices.

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Discussions Will Help Solve the Public Relations Problem

ALMOST any executive of an electric utility operating company will point with pride to the lack of friction between his organization and those it serves. Whence, then, the wraith that must be laid by "more public understanding" and "more publicity"? Why does the fourth estate rumble not incessantly yet with flashy upturnings? What is the problem that, as an industry, must be solved? Dean Mosher of the School of Citizenship and Public Affairs at Syracuse University, whose version of the story appears in this issue of the ELECTRICAL WORLD, comes very close indeed to stating a truth, and a truth that may as well be faced in the open without hypocrisy or barrages of misleading red-herring words about benefits and social obligations.

"Not long ago I participated in a discussion carried on by two men of wide experience in utility matters, both appealing to me as fair-minded. It was their judgment," said Dean Mosher, "that no one within the industry would dare set up and insist upon high ethical standards, condemning practices that are known to exist, because of the flarebacks that would come from their associates, their directors or their trade connections." Dean Mosher contends that holding-company practices constitute the gravest problem and that "the industry must be looked upon as a unit, one comprising the small operating company as well as the huge holding corporation. What affects one affects all." He suggests a code of ethics to be formulated as a definite direction and goal—and, "what is more difficult, have it adopted." One is reminded of the mice in the fable who would protect themselves from the house cat by tying a warning bell about her neck—but which mouse would tackle the job?

Sooner than is comfortable some action may become necessary in regard to holding-company policies. Dean Mosher's plea is both timely and practicable. Coming, as it does, from a friendly observer, it should be welcome. There should be discussion of management, financing and even of political relations at utility meetings so that an understanding may be had of good and bad practices. A formal code of ethics or practices would have little effect unless a common understanding existed of the reasons for the articles in the codes. This common understanding is best obtained by open discussion through which thoughts and experiences will be contributed by individuals. The consensus of opinion should rule and once ascertained might well be stated as an informal code or policy. Such things are largely a matter of understanding.

Looking Ahead in the Appliance Market

NOT the least interesting incident of last week's Washington convention of the National Electrical Manufacturers' Association was the joint meeting of the household appliance groups. The N.E.M.A. embraces the electric range, water-heater, refrigerator, fan and the small-heating appliance line. It does not include the clothes washer, dish washer, kitchen motor, ironing machine or vacuum cleaner. But the member groups held a meeting to discuss the possibilities of joint action to promote the market.

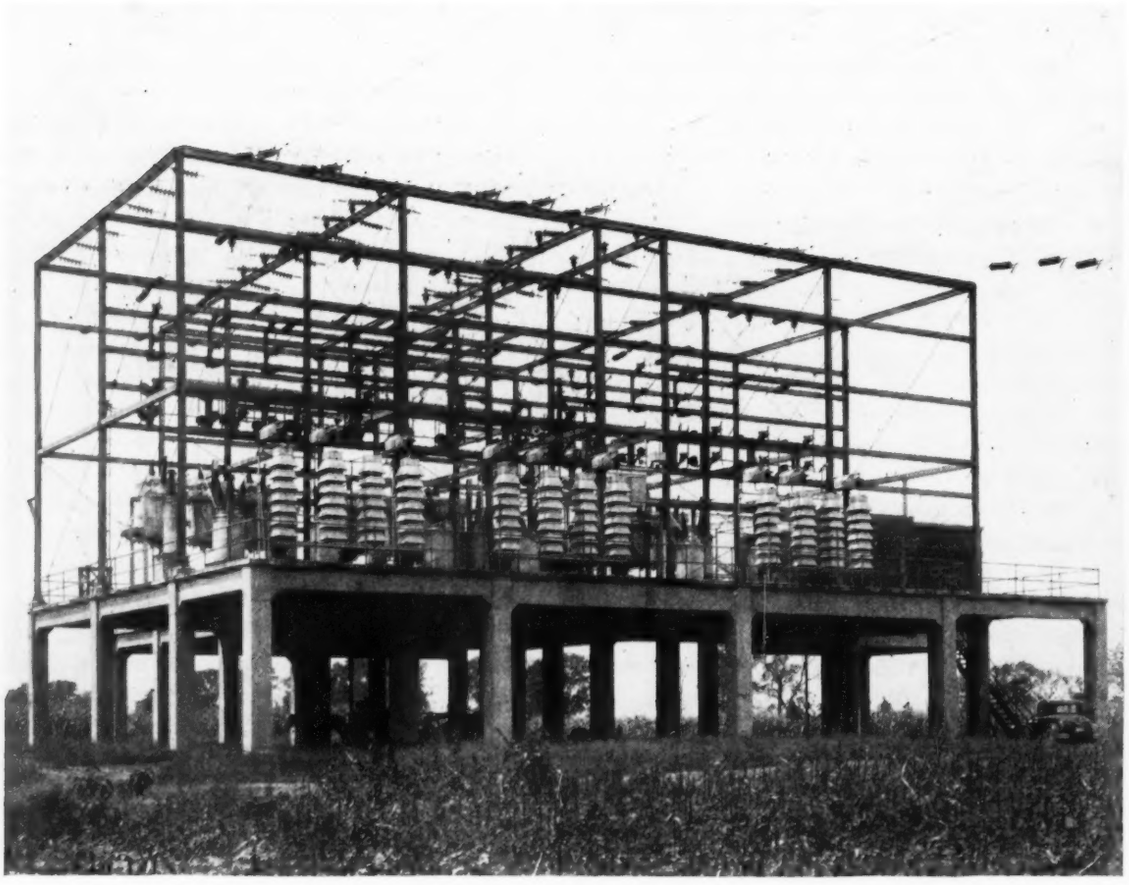
It is time. For today the electrical appliance manufacturer is badly out of step with the modern trend. Industry and business are fast drifting away from the idea of specialization in merchandise toward specialization in service, toward the service of a market rather than the promotion of a product. But the electrical man is still absorbed in his protracted pioneering operation, content to take new territories as they open and to seek new customers everywhere. He grows along with his expanding market, selling one appliance at a time, each manufacturer playing pretty much a lone hand.

It is worth considering, however, that an industry organized on such a basis is quite abnormal. Other seasoned industries find their chief market through obsolescence. Food, shoes, hardware are in universal use. All the world is busily consuming and wearing them out, and a vast continuous demand results. The electrical appliance industry will only become normal when these devices, too, are universally accepted, when the whole world will be busily wearing them out also and the forces of obsolescence are in full swing.

Clearly that will mean the day when every house that is built will be completely equipped with electrical labor-saving and comfort appliances as a matter of course. They will have become standard equipment, part of the house, financed in the mortgage. And these products will be in mass production, at lower prices, with every manufacturer striving for a large volume with all the keenness of imagination and efficiency that such competition brings. Witness the motor car for instance. It is a pretty picture as contrasted with the easy satisfaction that prolonged prosperity has made so typical of electrical men, who in their entire history have seen their business steadily expand ahead of them.

At the present rate of progress this universal market of electrical household appliances lies far ahead. Selling one appliance at a time, it will come too slowly to be of benefit to this generation. If this equipment is ever to be built into houses in complete installations, it is going to require some broader planning, and not by single manufacturers, but by the entire appliance industry working in the interest of the American home. The National Electrical Manufacturers' Association can render no greater service than by co-ordinating the full appliance field in a far-visioned program to this purpose.

An Importation from Borneo



IN THE jungles and marshlands of Borneo the Dyaks protect their homes from floods, reptiles and creeping things by erecting their huts on stilts. Here, in modern America, in a most modern industry we find an adaptation of this interesting structural characteristic. The structure shown is the 66-kv. Beargrass substation of the Louisville Gas & Electric Company, which is a connection point for ties with the Indiana Public Service Company and the Kentucky Hydro-Electric Company. The station is situated some distance from the Ohio River, but upon flat land subject to annual inundation, hence the stilts.

Accurate Load Forecasting

Five years' experience proves accuracy for Public Service of New Jersey system. Methods of analysis for forecasting

By R. N. CONWELL and M. D. HOOVEN

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ACCURATE load forecasting is the prerequisite to careful system planning. Some five years ago the Public Service Electric & Gas Company was faced with the necessity of developing a system plan of a larger order of magnitude than any which had previously been undertaken and at that time methods were developed which would unfold the future arithmetically. The application of these methods has shown a high order of accuracy, and while some of them are specifically applicable to the territory studied, they will prove interesting and suggestive of other methods which might be developed.

The power system is conveniently divided geographically for load forecasting purposes into six operating divisions, all of which are, or soon will be, electrically connected, but in each of which records of the past have been kept providing a firm statistical background.

In studying the development of methods for load forecasting it appears that kilowatts, the quantity which was essentially desired, was difficult to obtain directly from past records. A more tangible quantity was sought. As a fairly definite ratio was maintained between kilowatts and kilowatt-hours—in other words, the load factor over a period of years had been fairly constant—it was felt that kilowatt-hours represented a tangible something, like pounds of sugar, which could be talked of and analyzed. Furthermore, statistics were kept in such form as to show the kilowatt-hours sold for lighting, railway and industrial purposes, and each class within itself could be further analyzed. This more detailed analysis of classes of service was particularly necessary because of the variations of the sales of kilowatt-hours for industrial purposes in accordance with the business index and because business conditions have little or no effect upon the sales for lighting or railway purposes. Since the peak load of the system always occurred in November or December, kilowatt-hours sales and their ratio to kilowatts load were investigated for these two months only.

LIGHTING

In forecasting kilowatt-hours sold for lighting purposes during the months of November and December several methods were developed, only one of which will be described. Obviously, the sale of lighting kilowatt-hours depends primarily upon population, which, since government census statistics are available, can easily be projected into the future.

Dr. Raymond Pearl, in his book "The Biology of Population Growth," has pointed out that the population of any given area studied over a sufficient length of time gives a curve of the shape shown in Fig. 1, which is perhaps true in general of all growth curves. Dr. Pearl points out that a curve of this general shape holds for the growth of population which follows the placing of two flies, one male and one female, in a bottle with sufficient food. It will also be noted that this curve is of the general shape of the characteristic curve of a

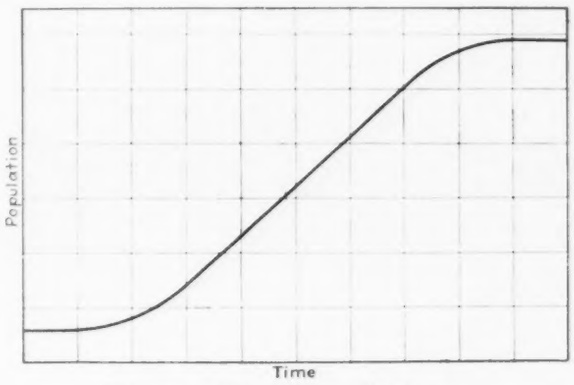


Fig. 1—The "Pearl" Curve of Population Growth

thermionic vacuum tube, which in a way illustrates the increase in the number of electrons which can occupy a given space under conditions of increasing plate voltage (corresponding to elapsed time in the comparison). Analysis shows that the population of the area in New Jersey served by the Public Service Electric & Gas Company is on the middle or the straight line section of the population curve. Consequently, a straight-line projection of population growth in this territory gives a result of sufficient accuracy for the period under consideration. Fig. 2 shows a record of the population of New Jersey.

The next step in the analysis was to determine the number of lighting customers which this forecast population would provide. The number of persons per meter in the area under consideration is shown in Fig. 3. It will be seen that the curve dropped rapidly during the first few years of the study and then became asymptotic at approximately 3.9 persons per meter. This meant, in effect, that saturation of the field served was to be reached in 1929. The figure at which the curve became asymptotic is slightly lower than the number of persons per family in New Jersey, 4.4; it is also lower than the

number of persons per gas meter reached in 1915 in the same area. The curve was made to flatten out at this lower point because of the tendency of the public served to use separate meters in garages, offices, etc. As is shown by the solid black line the forecast was well borne out by experience. It is obvious that for any given year, by dividing the population as given in the first analysis by the number of persons per meter as given by the second analysis, the number of meters, or customers, could be obtained. Incidentally, the figure thus obtained was used by the meter department in planning storage and repair space, etc.

Effect of Dilution Evident

Fig. 4 shows, plotted over a number of years, the kilowatt-hours consumed in the months of November and December by each customer, or meter. It was rather surprising, in view of the increased sales of appliances and the increased use of electricity for lighting purposes, to note the descending trend of the curve. This was due to the fact that each year more and more customers of smaller purchasing power were being added to the company's books; in other words, the "marginal" customer was being brought into the fold.

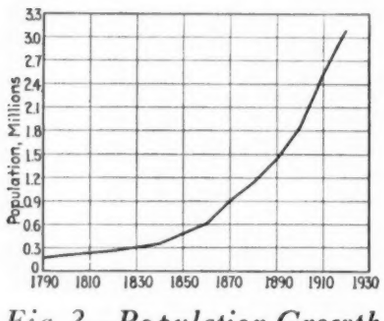


Fig. 2—Population Growth of New Jersey

Probably the first customers who bought electrical energy for lighting purposes were the occupants of large residences and the proprietors of stores, hotels, office buildings, etc. The more recent customers that have been enrolled do not require or cannot afford the relatively large amount of energy supplied to the earlier customers. With every family furnished with electric light the territory becomes "saturated," and at some time just before the saturation point the curve representing November and December kilowatt-hours consumption per meter (or per customer) begins to rise, due to increasing use of electrical appliances and lighting facilities. Thus it will be seen that the application of results obtained from Fig. 4 to those obtained from Figs. 2 and 3 will give a forecast of the kilowatt-hours to be expected for lighting purposes during the months of November and December in the area studied.

It must be pointed out, however, that in any given area local conditions must affect the application of these arithmetical formulas. For instance, in the city of Camden, which is part of the area being described, a bridge was projected which would connect directly with Philadelphia. The bridge was scheduled for completion in 1926. In order to estimate its effect on population growth in this area a study was made on the effects on population of the building of the Brooklyn Bridge between Manhattan and Brooklyn in 1883. It was observed that the completion of this bridge pushed forward the population growth of the Brooklyn area by about ten years. After this sudden jump the old population trend was resumed. Results of this analysis were then applied to the Camden district population estimate and the study proceeded with as outlined. Results have justified the application of this principle to the growth in Camden.

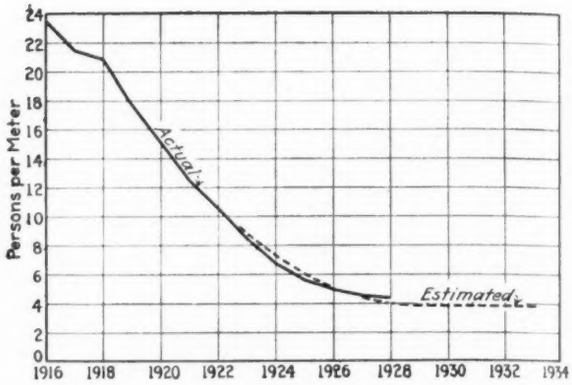


Fig. 3—Persons per Meter in the Area Surveyed

There are two kinds of population growth to be reckoned with in urban territories, i.e., horizontal and vertical. Horizontal growth is shown by a community whose development spreads outward to its geographical limits. Oftentimes an urban community will reach saturation in its horizontal growth and remain stationary in population for a fairly long period, neighboring communities taking advantage of the overflow. Then, due to the construction of many-storied office buildings and apartments, a new period of vertical growth in load or population will be entered into. This is particularly true of old, congested, metropolitan districts.

Industrial Consumption Affected by Business Cycles

In taking up the study of the sale of kilowatt-hours for industrial purposes, the analysis of past records showed the marked effect of business conditions upon this portion of the load. It is obviously impossible to prognosticate the business index, at least for any great period in the future. It is entirely possible, however, to forecast within the limits of prosperity and depression the growth of industrial use.

The group of statistics to be used as a basis for this study, which is comparable to the population statistics used in the lighting study, is, of course, the U. S. Census reports on primary horsepower, a figure which has been recorded for more than a century. A study of the past trend of this curve indicates that it is following the same general characteristics of growth as that shown by population curves and it is so extended, the three censuses of manufactures which have been made available since the first extrapolation of this curve having justified this reasoning. In passing, it should be noted that one of the other methods used attempted to work out a forecast on the basis of wage earners, but later studies have shown that in New Jersey the installation

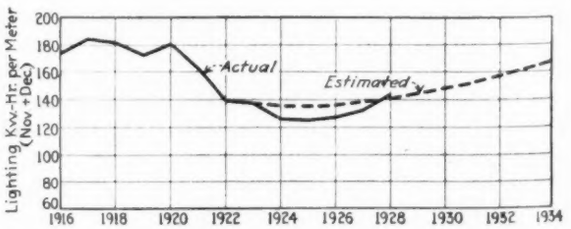


Fig. 4—Kilowatt-Hours Consumed by Lighting Customers in November and December

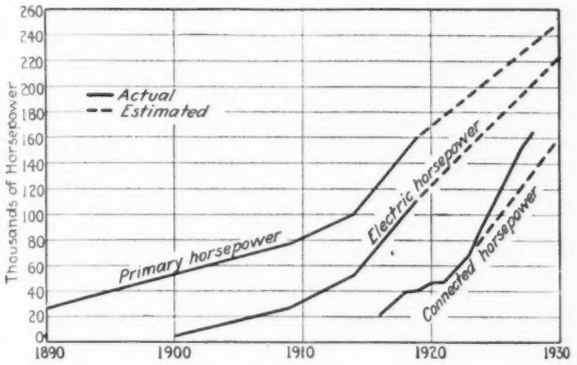


Fig. 5—Curves from Census of Manufactures Indicating Industrial Load

of primary horsepower is very evidently replacing manual labor as the number of wage earners is decreasing in the face of the rapid growth shown in horsepower. Studies are now under way to work out some ratios which may explain this phenomenon and which may present an even better basis for forecasting purposes.

Obviously the next figure of the most value obtainable from the census of manufactures is electric horsepower, which gives a measure of replacement of all of the older forms of primary horsepower by electricity. Another figure which began to appear very early in census records was rented horsepower, which, initially, meant that a man who owned a waterwheel would rent a pulley on his shafting to a neighbor; at the present time, however, it means largely the horsepower rented by the electric supply utilities and corresponds in general to the term known in power company records as connected load. Fig. 5 shows these three curves plotted to the same scale. It indicates that in general all of the growth in power supplied is being taken by the utility. Of course every year some isolated plants are being taken out of service and utility power supplied, but at the same time evidently some isolated plants are newly established. It would seem in general quite fair to forecast the growth of rented or connected horsepower as parallel to or slightly converging with the curve representing the growth of primary horsepower. An additional check is obtained on the curves representing horsepower by an occasional census of every district of the territory which is made by the company. A further check on the term rented horsepower is obtained from company records which indicate connected load in horsepower. Properly interpreted and corrected for territory, these two curves agree.

The curve of connected load appears to be but very slightly affected by variations in business conditions; in other words, a steady industrial growth seems to take place at all times, business conditions apparently affecting only the amount of power consumed.

In studying the effect of business conditions on load it was necessary to find an index which would give a comparison of the business of the company with national business. This index was developed as a ratio representing hours' use of connected load. Such an index, it is believed, represents a more accurate indication of business conditions than that given by the many statistical business indices now in use which are based on car loadings, pig iron production and like data which happen after the fact. The hours' use of connected load is an index which has its finger on the pulse of industry at the instant that pulse is beating. It is, of course, quite apparent that during prosperous times factories work full time or over time with the same connected load, consuming more kilowatt-hours and thus making the hours' use index higher. A comparison of the *Annalist* (New York *Times*) business index for November and December and the hours' use index for the months of November and December only is given in Fig. 6.

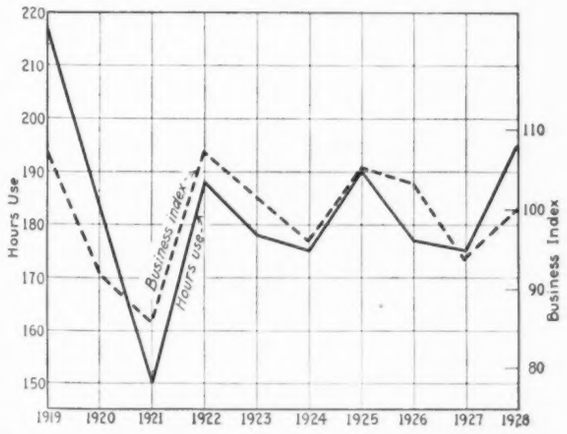


Fig. 6—Comparison of "Annalist" Business Index and Hours' Use Index

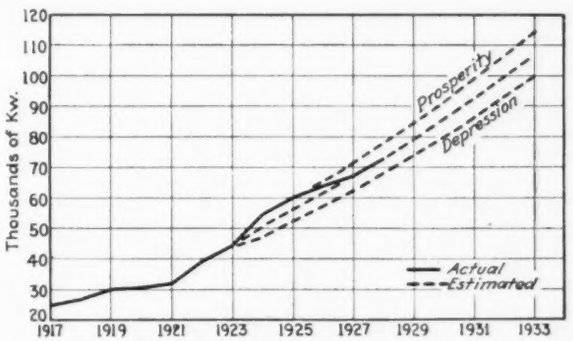


Fig. 7—A Forecast and Actual Peak-Load Curve for One Area

By taking for any given year the forecast connected load for November and December of that year, multiplying it by the normal hours' use for the same period the number of kilowatt-hours to be consumed for industrial purposes may be obtained. By taking the peaks and dips of the curve as the limits of prosperity and depression, a limit on the future variations of industrial consumption can be placed. In a forecast of this nature the actual load may surpass the estimate in the comparatively small area under consideration because of the connection of one or more new large customers, but later studies, of course, will correct the forecast.

Traction Load Considered

The two methods described above and other similar methods give a good picture of the growth of what might be called the company's normal demand. In addition, however, there is taken into account the future of the electric traction load, which is determined from an analysis of transportation statistics. Also, the load which might be made up from future railroad electrifications must not be neglected. A separate and quite

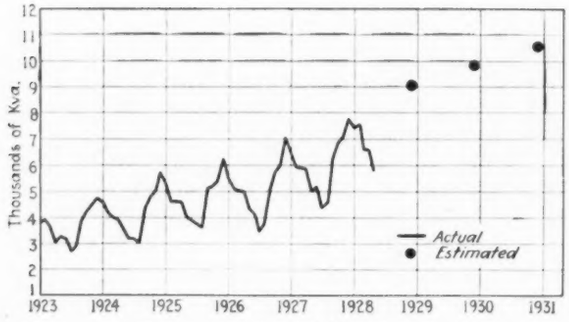


Fig. 8—Recorded and Estimated Loads for One Substation

general study has been made of the railroads in the territory in order to determine the approximate amount of demands which might be thrown on the power system by such developments. The basis used for such studies was the 1921 Superpower Report.

Such studies as above outlined are applied both to the territory as a whole and to individual divisions of the territory. The diversity between the summation of the division loads and the system loads is calculated for the past and present years and then calculated on the forecasts. If any great discrepancy is found each study is reanalyzed in order to determine any possible fallacies. The larger the area under consideration, of course, the smoother will be the curves, with a greater accuracy of results. Fig. 7 shows a forecast and an actual peak load curve in one geographical area.

Study of Limited Areas

For a limited area, such as that served by one substation, a local study must be made, there seldom being sufficient statistics available to provide a firm basis for forecasts in the manner described above. Past trend curves are extrapolated and any local conditions which would affect these trends materially are taken into account. Fig. 8 shows the extension of such a curve. When it is necessary to make a very detailed study of a certain specified region a street and house count is entered into. It has been found that in general present-day real estate values will somewhat foretell the use to which any plot of ground may in the future be put. Studies of this type also have brought out the rather interesting conclusion that a minor district will in almost all cases grow at approximately the same rate as the larger district of which it is a part. Forecast substation loads are also totaled for any given area and the summation of their load with the proper diversity applied is compared with the result obtained by the more general studies described above.

Armed with the results of many such studies of the future as these, advance planning may be carried on with the assurance that each new installation will serve a useful purpose throughout its life. It is also possible to lay out several schemes for the supply of power to an area and compare the costs and service features of each so that the best plan suited to the needs of the area may be selected.

Actual Lightning Surges Recorded

Wave front rise at 100-300 kv. per microsecond. High surges persisted over half voltage for 40 or more microseconds.

By J. H. Cox
Transmission Engineer
Westinghouse Electric & Manufacturing Company

CONSIDERING the fact that with four cathode-ray oscillographs connected to transmission lines during the summer of 1928 only two satisfactory records of actual lightning surges were obtained, remarkable progress has been made during the lightning season of 1929. Of course a larger number of oscillographs have been installed, but the number of records per instrument has been a great deal larger than in the previous year.

Five of the cathode-ray oscillograph installations were of the Norinder type and were operated by the Westinghouse Electric & Manufacturing Company in conjunction with various operating utilities. Fig. 2 A, B, C are representative of the lightning records obtained with these instruments. These particular records were obtained on a 220-kv. line without a ground wire and insulated with sixteen standard suspension insulators. Fig. 1 A, B, C show the same surges replotted to a linear time scale. These oscillograms were made with an oscillating

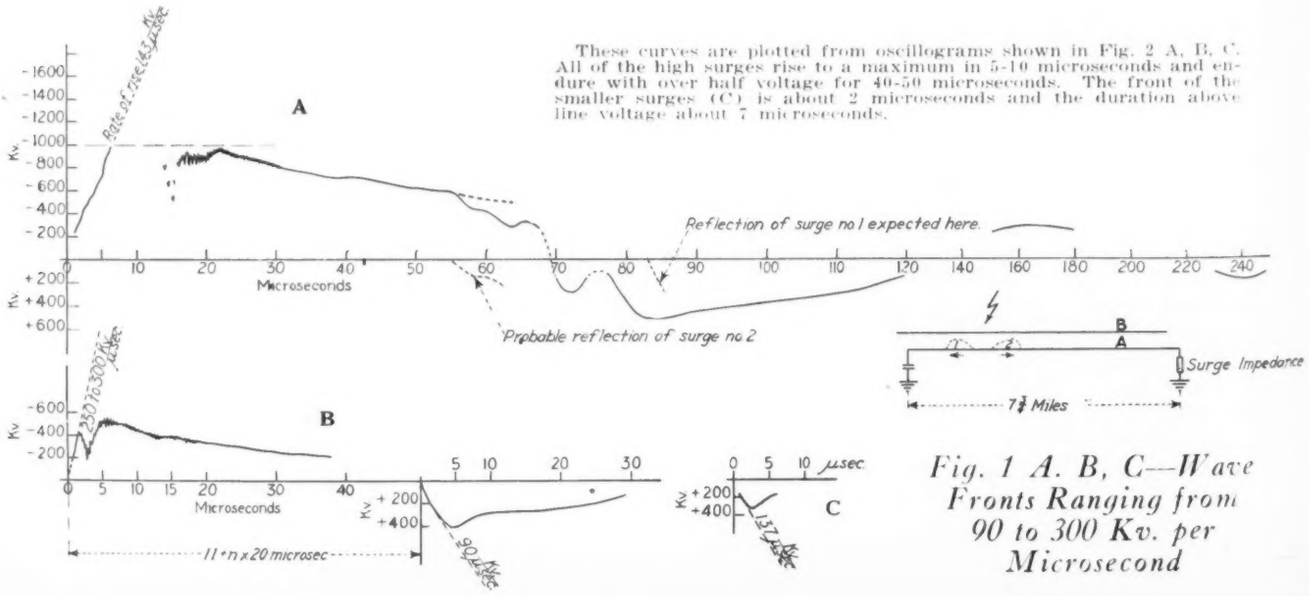
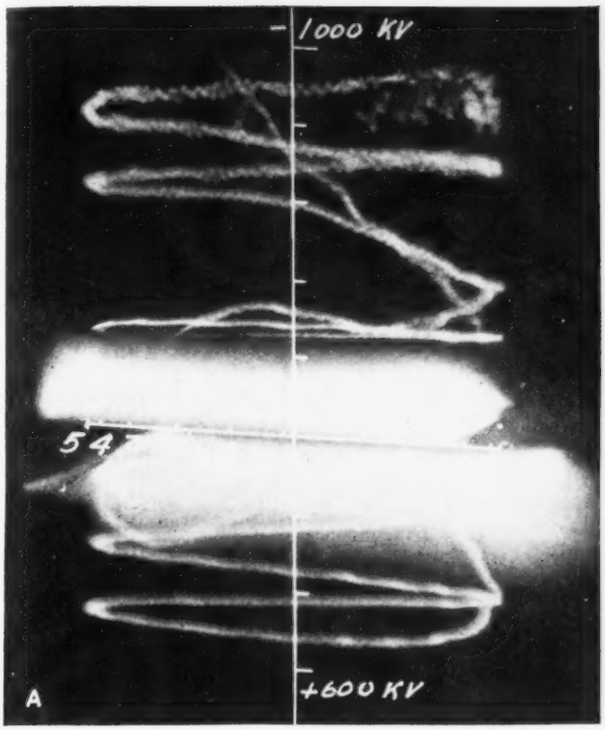
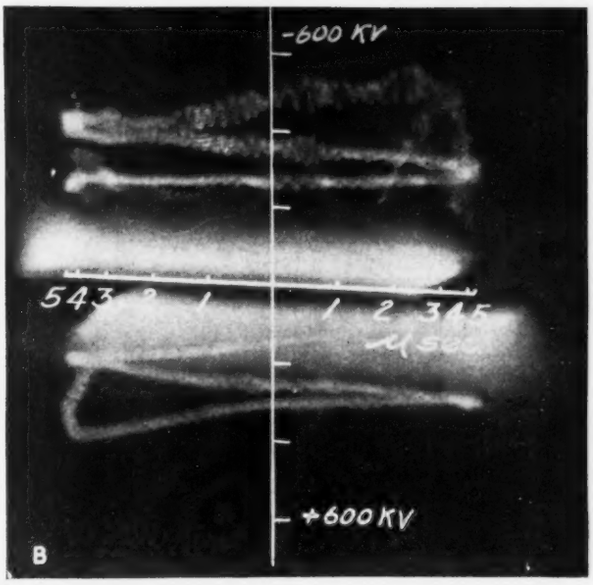

These curves are plotted from oscillograms shown in Fig. 2 A, B, C. All of the high surges rise to a maximum in 5-10 microseconds and endure with over half voltage for 40-50 microseconds. The front of the smaller surges (C) is about 2 microseconds and the duration above line voltage about 7 microseconds.
A
B
C
Kv
Microseconds
Reflection of surge no 1 expected here.
Probable reflection of surge no 2
Surge Impedance
7¾ Miles
11 + n x 20 microsec
μsec

Fig. 1 A, B, C—Wave Fronts Ranging from 90 to 300 Kv. per Microsecond





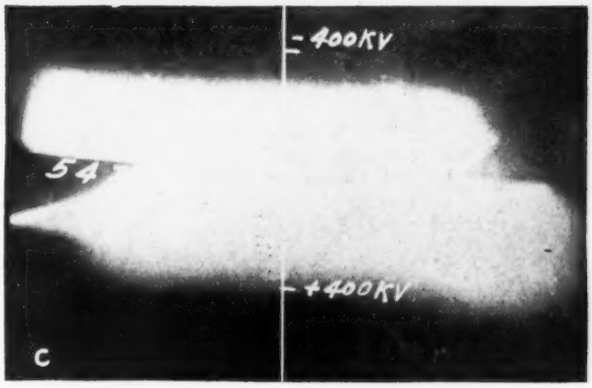


Fig. 2 A, B, C,—Three Lightning Surges Ranging from About 350 Kv. to 1,000 Kv.

time scale which permits the recording of the entire wave and its reflection regardless of duration. The records are easily replotted to make them easier to read. Also, the Norinder type of cathode-ray oscillograph records the entire wave, including the front, which is above the normal line voltage.

The records obtained this year add evidence to that obtained last year regarding lightning wave shapes. All of the high surges recorded have fronts which rise to a maximum in the order of five to ten microseconds and endure with over half voltage for 40 or more microseconds. The fronts of the waves illustrated have slopes of 100 to 300 kv. per microsecond. The particular significance of these records is that with waves of these characteristics the lightning strength of a transmission line is very little above its 60-cycle crest flashover value.

Figs. 1 C and 2 C show a smaller surge, of the order of two times normal line voltage. This surge had a front of the order of two microseconds and a duration above line voltage of seven microseconds. This is typical of most of the small surges recorded in that it has a shorter front and shorter duration than the higher valued surges. Although the front is shorter, its slope is no greater than that of the higher valued surges because of the lower crest value. It is possible that these smaller surges are due to induced strokes and the higher ones due to direct strokes, but it is also possible that they are merely the crest of lower valued surges of long duration.

Too Many International Societies

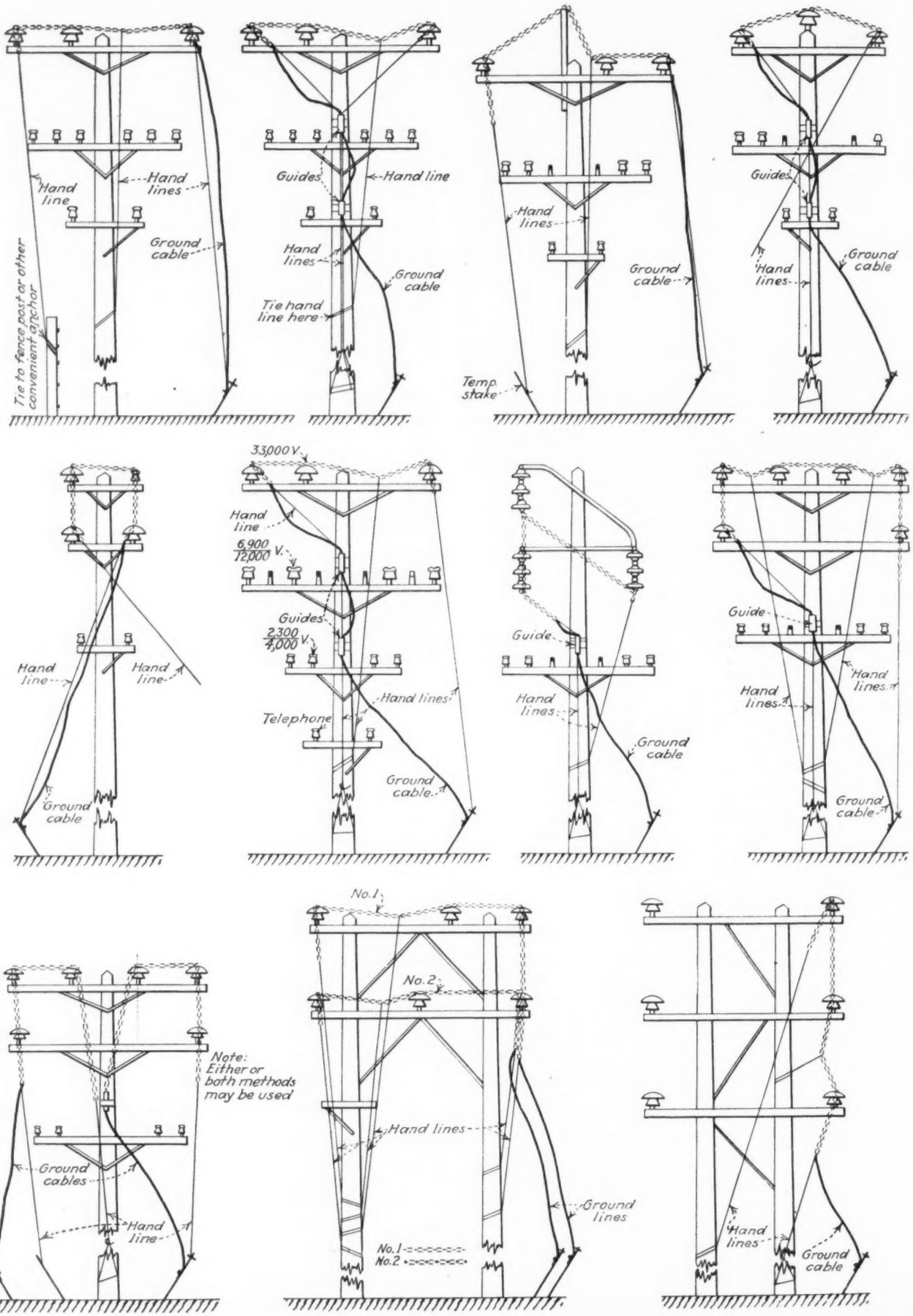
"THERE are now about fifty associations of engineers to deal with things international, nineteen of them for electrical matters. With this large number of bodies, is there not risk of a lack of co-ordination? It might be well for electrical men to get together on this subject. True, we have the International Electrotechnical Commission, but its field is that of standardization, for which it is the appropriate and effective agency. To burden it with other duties might not be wise. To look after these, some other unified agency might well be established."

FRANK GILL, *past-president of the Institution of Electrical Engineers (British), speaking at the recent farewell dinner in New York to the delegates to the Tokio World Engineering Congress.*

Installing Grounding Chains on Pole Lines

APPROVED methods for using grounding chains on the lines of the Public Service Company of Northern Illinois for voltages between 2,300 and 33,000 involve standard "Copperweld" 15½-ft. chains with 50 ft. of No. 4 rubber-covered 5,000-volt wire permanently fastened at one end. The free end carries a ground clamp for fastening to the "Copperweld" ground bar, which is driven into the earth not less than 6 in. or more than 8 ft. from the pole base. A handline is permanently

Methods of Short Circuiting and Grounding Different Types of Pole Lines



attached to the remaining end of the chain and wire; another handline is attached to the junction of the chain and the wire; these handlines are to guide the chain over the conductors and allow means for putting it into place and keeping it taut.

The specific method of threading the handline over the power conductors will depend upon the type of construction and conditions along the line to be grounded and certain details must necessarily be left to the judgment of the foreman. The foreman shall study the conditions and apply the approved method of grounding suitable to the job; always taking all precautions to protect the workmen and equipment by using sufficient protective devices to insure safety. The ground clamp on the wire shall be fastened to the ground rod or ground connection which has been installed first. A free handline is then passed over the conductors and fastened to the handline which is permanently attached to the chain. A man wearing rubber gloves and standing in the clear then pulls the chain over all conductors.

Whenever necessary, approved guides, as indicated in the sketches, shall be used, thus permitting the grounding device to be passed up the pole within the normal climbing space. The guide is an insulating tube carried by a leather strap which is buckled around the pole and through which the chain and handline are passed, thus avoiding the possibility of making contact with the distribution wires mounted under the transmission lines.

Network Short Circuits Not Always Self-Clearing

By W. R. Bullard
Assistant Engineer Electric Bond & Share Company

LOW voltage a.-c. network systems are rapidly coming into use in many cities of the United States, as well as in foreign countries. One of the problems with which such systems are vitally concerned is the so-called self-clearing feature of low-voltage mains, that is, the ability of a network system to burn clear any low-voltage short circuits which may occur. This problem is now fairly well understood by those engineers who have closely followed the development of a.-c. networks, but due to lack of published data is somewhat of a mystery to many engineers just starting on the design of such systems. The following information, which has previously been unpublished, is offered for the benefit of the latter class of engineers, as applying to underground network systems of 220 volts or less between live conductors.

In the early stages of network development it was thought that the a.-c. arc due to a short circuit in the secondary mains of a network system would always be immediately extinguished when such arc was established by the actual opening of the metallic circuit. This assumption was apparently borne out by numerous experiments. However, these experiments were negative in their character in that they merely demonstrated the difficulty of establishing a sustained arc under the various test conditions, and did not determine what conditions might be necessary actually to produce such an arc in a low-voltage cable.

Supervised companies of the Electric Bond & Share Company now have in operation seven network systems in various cities and considerable operating experience with these systems has been realized. In two or three of these systems, shortly after the start of operation, low-voltage short circuits were experienced which contradicted the early assumption that all low-voltage arcs would be self-extinguishing. That is, arcs were experienced which did not extinguish themselves, but were maintained for appreciable periods of time, destroying a considerable amount of cable in the process. A series of tests were then conducted to determine the reason for this phenomenon and in what respect the previous assumption was erroneous.

Tests Indicate Service Factors

Sustained arcs can be established in practically any of the ordinary types of low-voltage mains, whether they consist of three-conductor or single-conductor cable or whether the insulation is paper, varnished cambric or rubber. The condition which will bring about the occurrence of such sustained arcs is that the insulation of the cables be carbonized for an appreciable distance along the circuit length prior to the establishment of the arc. This may be brought about by short-circuit current of such value that it will not immediately melt the copper conductor, but will heat it up to sufficiently high temperature to cause carbonization of the insulation. It is not known that this is the only condition which will produce a sustained arc, but it is felt that it is the most important one. The tests which established the above fact were made, under the direction of the writer, in Havana, Cuba, in August, 1926, by the Havana Electric Railway, Light & Power Company (now Cia Cubana de Electricidad).

This matter is serious, although not quite so serious as it might appear at first sight, for the reason that although an arc can sustain itself in a cable, no cases are on record within the knowledge of the writer where such an arc has burned past a splice. The greater separation of conductors and greater radiating surface of a splice have, in all cases known to the writer, been sufficient to cause the arc to extinguish itself when it reaches this point in the circuit. Furthermore, conditions involving a solid metallic short circuit which would remain in the state of a complete metallic circuit for an appreciable length of time are rather unusual in a low-voltage system of the network type, and therefore such short circuits are seldom encountered, even in cases where this feature has been given little or no consideration in the system design.

One remedy which may be used with reasonable safety to avoid the occurrence of any self-sustaining arc is to so proportion the low-voltage conductor size with respect to the current-producing capacity of the system that any short circuit will very quickly melt the metal and open the circuit at some point. Another remedy which is being considered, but which has not been given an actual service test, is that of maintaining sufficient separation between the conductors to make the circuit practically short-circuit proof. One way of accomplishing this, for instance, might be to use single-conductor non-metallic armored cable buried directly in the ground, with a reasonably large separation between the different cables of the circuit, say 1 or 2 in.

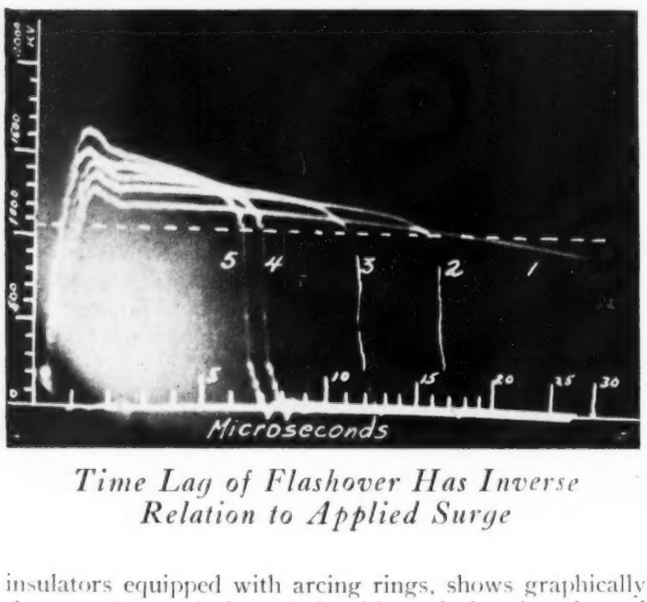
The sustained arcs which have occurred in the network systems referred to have in each case been due to various peculiar unforeseen circuit conditions and in all cases the conditions which were responsible for the trouble have been removed. Therefore, no similar trouble on these systems is expected in the future.

Time Lag of Flashover

By P. H. McAuley
Material and Process Engineer
Westinghouse Electric & Manufacturing Company

THE time lag of flashover of insulation on surge voltages may be defined as the time between the rise of voltage above the 60-cycle breakdown value and the abrupt drop in voltage when breakdown occurs. This corresponds to the time during which the surge voltage exceeds the 60-cycle flashover value. The actual time lag values have an inverse relation to the magnitude of the applied surge voltage.

The accompanying cathode-ray oscillogram, which was obtained from five successive accurately synchronized voltage applications to a string of sixteen suspension



Time Lag of Flashover Has Inverse Relation to Applied Surge

insulators equipped with arcing rings, shows graphically the meaning and the relationships of the time lag of flashover.

The 60-cycle crest flashover voltage is indicated by the broken line, while an analysis of the oscillogram reveals the facts shown in the accompanying table.

This gives four points on the time lag curve of the insulation tested. Normally about twenty points are required to give a complete time lag of flashover curve for the range of one-half to twenty microseconds, with a fair degree of accuracy.

It will be noticed that the impulse ratio varies from 1.23 to 1.44. Actually the impulse ratio is a curve similar to the time lag curve. Naturally the time lag and impulse ratio curves vary a good deal in form and magnitude for different pieces of apparatus. However, it has been found that they are very similar for identical equipment of different voltage ratings. In other words, the impulse ratio curve, which is independent of the 60-cycle flashover value, is practically the same for a five- as for a fifteen-unit string of insulators.

Time Lag and Impulse Ratios for a String of Sixteen Insulators with Arcing Rings

Wave	Voltage (Kv.)	Time Lag (Microseconds)	Impulse Ratio
1*	1,200	17	
2	1,300	15	1.23
3	1,350	10.5	1.27
4	1,425	6.3	1.34
5	1,525	5.6	1.44

*No. 1 is a 1,200-kv. full wave which rises to crest value in one microsecond and drops to 1,000 kv., or 83 per cent maximum, in 25 microseconds.

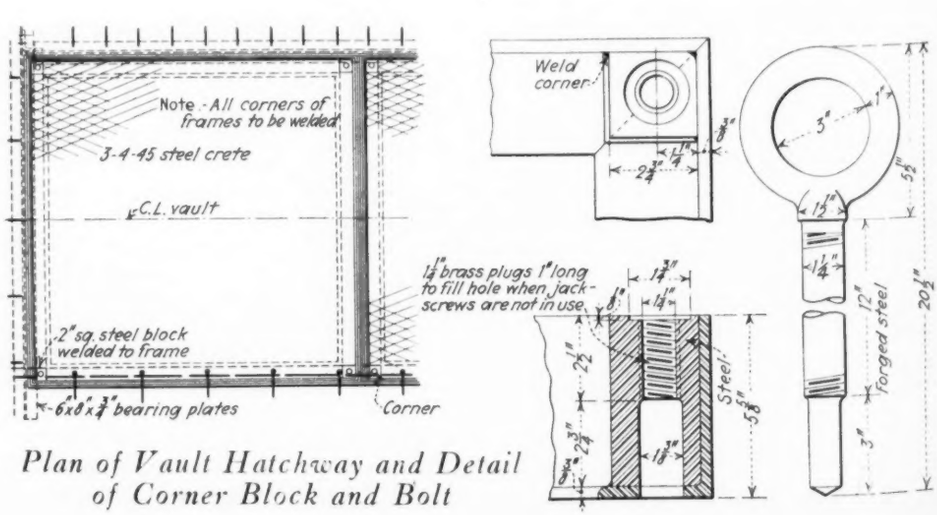
When the complete time lag curves of two or more pieces of apparatus are available their flashover performance when connected as in service can be predicted with considerable accuracy. Conversely, the time lag curves may cross at one or more points and it is wrong to draw conclusions from tests covering only a limited section of the time lag curves.

Improved Hatchway Design for Sidewalk Vaults

By J. A. Lytle
Underground Engineer
Narragansett Electric Company, Providence, R. I.

"THE house-raising jack principle" for removing reinforced concrete hatches from network type transformer vaults has been successfully adopted by the Narragansett company. The construction used to apply this principle consists of a 2-in. square block of steel welded to each corner of the angle frame of the hatchway, as shown on the accompanying illustration. This block is drilled and threaded for a 1¼-in. lifting screw. The lifting screw is 20½ in. long and provided with a 3-in. eye for the insertion of an iron bar.

The hatchway is raised by the screw jacks until it is clear of the angle-iron frame in the sidewalk slab. Iron bars are then inserted through the screw eyes and the cover removed from the frame. This method of handling the hatchway eliminates the necessity for a tripod and chain block. Another desirable feature is that the hatchway can be raised without difficulty should the angle frames become corroded. A brass plug is screwed into the steel block to fill the hole after the hatchway is set in place.



Plan of Vault Hatchway and Detail of Corner Block and Bolt

Submetering—A Menace

By A. E. KNOWLTON

Associate Professor of Electrical Engineering Yale University, New Haven, Conn.

The asserted right of New York building owners to purchase electricity at wholesale and resell at retail conflicts with the established conception of a regulated public service industry

SUBMETERING is the abbreviated designation of the practice in which the building owner purchases electric or other service from the public service company at wholesale rates and resells it at retail rates to his tenants. The function of billing the customer and of reading and maintaining the meters is usually delegated by contract to a so-called submetering company. The whole practice is a perfectly natural consequence of the spread between the charges for large and small blocks of power.

It had its origin in the competitive position in which the utility company found itself some twenty or more years ago with respect to the privately owned heating and lighting plants in industrial and tenanted buildings. New York City pioneered in skyscrapers and large apartment houses and the New York Edison Company was therefore among the earliest to be confronted with the necessity of adopting a policy. In order to win and hold these building owners as customers it appeared necessary to compensate them for the abandonment of their private plants by permitting them to retain their sales relations with their tenants. In fact, it appears that the power sales engineers pointed to the possible profit to the landlord as one more item of pecuniary advantage to him in purchasing instead of making his own power. Nor does it appear that the establishment of the submetering company as a logical development of this situation was wholly undesired by the Edison company.

Further than this, the Public Service Commission by an order dated October 15, 1915, confirmed the submetering practice that today returns to vex the successor board, now that the Edison company asks support in opposing the practice. In that order the company was directed not to refuse service to owners of private plants or their patrons provided the plants did not sell energy outside the owner's premises. Only the master meter was to be placed by and be the property of the Edison company.

The magnitude of the problem may be gathered from the fact that 2,015 Manhattan building owners purchase all of the electrical energy requirements of their tenants at wholesale and resell to them at retail prices. In the four boroughs the submetering involves 567,000,000 kw.-hr. annually through 10,154 meters to probably 200,000 tenant-consumers, enough to populate a city like Worcester, Mass. Some single submetered buildings house populations equal to whole towns. The spread between the two totals, wholesale and retail, is about $14,000,000, and M. S. Sloan, president of the New York Edison Company, has said that if he could deal directly with all these ultimate consumers a large portion of the increased revenue could be applied to an immediate decrease in rates to all consumers of the system. The submetering practice adds to the four parties definitely identified in the institution of public utility regulation (namely, the consumer, the operating utility company, the investor and the state) two more, the landlord and the submetering company. The injection of these newcomers into an otherwise perfect pattern greatly complicates the functioning of the regulatory principles. The intrusion of the holding company into the same picture has similar elements of confusion, somewhat more remote and less tangible, however, in its disturbance of established regulatory procedure.

Does submetering present an insoluble regulatory mixture because of the multiplicity of ingredients? Has the submetering business a vested right to existence? Has the building owner acquired a lasting right to low rates for building service and the right to profit on electricity resold to his tenants? Is submetering an unmitigated evil and a menace to the complete unfolding of universal electric service?

THE ANSWER IS EVIDENT

In approaching an answer to these questions it appears profitable to examine the viewpoints of the various parties at interest, note how discordant they are, and how foreign to the customary problems calling for commission decisions. Either a common denominator must be found or else the decision will have to be based upon the more or less arbitrary selection of a dominant interest. In the latter eventuality shall it be the interests of the building owner, the submetering company, the utility company, the tenant, or the general consuming public which shall determine?

Contemplation of the extremes often helps in visualizing the real import of a vexing situation and thus it is well to pause and picture the future with submetering indefinitely extended in magnitude and still outside the embrace of regulation.

The reduction in number of small domestic and commercial customers would result in a decrease in revenue to the electric companies, not offset by a corresponding decrease in the cost of operations. The inevitable result would be relatively higher rates for all classes of service, including the remaining direct customers and the wholesale rate to the landlords and submetering companies. Meanwhile a large portion of the consuming public would have been removed from the protective shelter of state regulation. It is not conceivable that this retrogression in regulation could eventuate in an era in which the public is weighing the influence of the holding company and groping for a means to bring its activities under scrutiny, if not ultimate regulation, like the operating companies.

Again, electric service in the homes and in industry is still far from saturation and considerable educating must still be done to enlarge the scope and the intensity of electrification. That this goal is not merely a selfish aim, but one that holds great benefits for the American public, is attested by the steady decrease in rates and the multiplied convenience and economy of use of the service. The expansion of unregulated submetering would definitely deprive the consumers of the opportunity to be informed authoritatively and actively about newer, broader and better uses of electricity. The submetering companies as at present constituted could hardly be viewed as competent and eager to push electrical development to full fruition.

If the system has little to make its expansion attractive it must lack many elements to justify its continuance, at least in its present form. On the fundamental basis of a complete, unified and economical service to customers submetering should be abolished.

I. *Abolish It*—Some states have already ruled submetering out. If New York does likewise it will probably have to do so on the grounds that broad public policy is paramount and the interests of building owners

Views of Interested Parties

Public Service Commission

When the landlord or his agent, the submetering company, sells electrical energy to the tenant by meter, he is to all intents and purposes performing a public utility function.

The statutes do not at present subject this landlord activity to regulation. The commission, which does have jurisdiction over the relations between direct consumers and the public utility company, is in this instance deprived of the opportunity to render to all ultimate consumers the service dictated by statute.

The circumstances lead to discriminatory actions of all sorts, and these the commission is powerless to prevent.

A statute declaring the submetering practice to be a utility function and thus subjecting landlords and submetering companies to the public service law would greatly increase the burden on the commission. It would be difficult to determine the submetering investment and operating costs.

Utility Company Attitude

Reselling of electrical energy to the consumer is by law a business affected with a public interest.

Utility companies are given limited charters and franchises to conduct a business wholly under regulation by the state.

The utility company should have direct relations with all ultimate users of the service and direct responsibility to them for the quality and cost of the service.

No one should be charged rates or rents for electricity which are not subject to the same public regulation and control as if the transaction had been direct.

"We are opposed to any practice which permits submetering agencies or property owners to resell electricity generated by us at rates which are arbitrary, unregulated, discriminatory or at an advance over what is paid to us."

The building owner and his agent are competitors of the utility company for that portion of return and profit that can be made on the difference between wholesale and retail prices. It has been decided that a public utility company is not required to serve a competitor for the purpose of furthering the business operations of the rival.

The regulated utility is held to higher standards of performance as to meter testing and accuracy than the submetering company is likely to maintain voluntarily. The same is true about the size of deposits and the interest on them.

Customers charge all their electric troubles to the utility company. The service department, maintained at all hours for instant service, cannot distinguish between direct customers and submetered consumers, and thus responds to calls and remedies troubles for which the submetering company is collecting in the retail rate.

Electricity is not a commodity. It is a service that by reason of its inherently monopolistic and state-regulated character should be reposed in one single local agency, with whom all ultimate consumers can deal.

Tenant's Position

The tenant is frequently charged rates in excess of the regular company rates for the same service.

Tenants have complained that coal clauses were applied by the building owner or submetering company after they had been removed by the utility company.

Submetering companies do not all, as does the utility company, keep service men available at night to restore service after local interruptions.

Where dispute over bills or service has led to disconnection, the tenant has no recourse to a publicly constituted regulatory authority for adjustment of the controversy.

The tenant lacks a moral right to the advice and educational assistance of the utility company in the selection and use of electric appliances to his best comfort, convenience and economy.

The submetering companies have a schedule of charges for meter tests and also other practices at variance with those of the Public Service Commission or of the companies as established by the commission.

Building Owner's Claims

Historically, submetering was instigated and encouraged by the utility company.

(a) Private plants in older buildings were abandoned because the lighting company offered a sufficiently low competitive rate.

(b) To earn the necessarily low rate the building owner was encouraged by the utility to lump the loads of all users in the building.

(c) At the outset the utility company provided the metering and billing for the owners in rendering the electric service to the tenants.

(d) Until war conditions interposed in 1917, lighting for offices was covered by the rental charge; at that time the utility assisted building owners in putting office buildings on the same submetered basis as apartments and lofts.

(e) It would be inequitable to rule out submetering now that few buildings have cellar and chimney designs conducive to establishments of local power plants.

The building owner claims that the interest of the electric company in the electrical energy terminates at the same point where the company's facilities terminate, namely, at the service entrance to the building.

He holds that once he has paid the price appropriate for the magnitude and character of the total building load, he has acquired a proprietary interest in the electrical energy as a commodity and can sell it as he pleases over an approved wiring system.

He holds it would be unfair for the utility company to sell energy directly to the tenant over distribution wires which must be maintained to municipal and company standards at the expense of the building owner.

Elimination of submetering would deprive the building owner of:

1. A direct return on investment in electrical wiring.
2. A profit on a legitimate business adjunct of renting.
3. As low a rate on power and lights for hallways, elevators, etc.

It would increase the burden on owners, decrease values and increase the cost of building operations.

In short, submetering at a profit is a vested right of the building owner.

Submetering Company

The submetering company has a growing business of more than 30 years' standing that would be destroyed by the abolition of submetering.

There is a large investment in testing laboratories, installation equipment and inspection facilities equal in all respects to those maintained by the utility companies.

There is an intrinsic value in the staff of trained employees for meter reading and testing, billing, etc.

The profits shared with the building owner are a legitimate profit from a legitimate, logical, useful and historical service.

Interest of the Public

All electric consumers are entitled to the same rate for the same service and as low rates and as good service as can profitably be established by the utility company.

Any factor that prevents the lowest rate or the lowest component of rate is detrimental to the interest of all consumers.

Submetering keeps the total number of customers below the true value; therefore, the quotient per-customer component in a two-part rate will be unduly high.

All consumers suffer if the continuance of submetering prevents a voluntary rate reduction.

On the other hand, the general public would be the loser if the abandonment of submetering led to the installation of many private power plants, with the attendant smoke pollution of the atmosphere and the coal-and-ash traffic congestion of the streets.

and submetering companies must be subordinated to the superior needs of the whole consuming public. Such a result would undoubtedly involve recognition of the rights of building owners and submetering companies to the extent of approving the plans of the utility company to take over the facilities and perhaps the staffs of the latter. The eagerness of utility companies to acquire the properties of non-competing utility companies remotely situated should be duplicated in this instance by a reasonable degree of magnanimity in taking over the assets of a competing unit which it now views as a parasitic growth within its midst.

The adjustment with the building owner should involve lesser amounts than with the submetering company because practically all of the wiring accessories, etc., now needed in the building for submetering would be employed in identical form with direct utility service to the tenant. It is today a recognized responsibility of the landlord to provide building facilities that will permit the tenants to utilize the common forms of public utility services.

II. *Regulate and Restrict It*—To subject the submetering activity to regulation will require an incisive modification of the organic statutes establishing public utility regulation. The building owner has practically been omitted from the scope of the regulatory bodies. Any effective move to bring him or his agent, the submetering company, into the fold of regulation will give the ultimate consumer, as a tenant, the same degree of protection against unfair rates and practices as the direct consumer has under regulation. Incidentally, the changes in the law would undoubtedly help clarify the relations between the utility's inspection service and the municipality on matters of conformity with wiring codes, etc., and also the matter of credit and deposits to insure payments of bills. These items are representative of several that now vex the companies and the commissions because the building owner is not a party to regulation.

III. *Expand It*—If the exigencies of the situation result in the ratification of submetering and its adoption into the well-regulated family it is reasonably certain that it will be with us for some time and may even spread. In fact, it is hinted it may very well prove to be the means whereby the American public recovers for itself a measure of direct access to those who are the ultimate vendors to it of the regulated electric service.

Big organizations inherently remove the authoritative officials from the reach of the individual consumer and the holding company phenomenon of the recent period tends to accentuate this lack of personal touch that was a feature of locally owned and managed utilities. The New York case is therefore of major importance because the result will undoubtedly have great influence on the situation in other areas. The New York decision will either obliterate submetering, and thus remove a menace to a greater electrical era in homes and industry, or else it may confirm and preserve for future elaboration one more potential threat of the public to the possible development of a centralized, dehumanized and machine-like national public service monopoly.

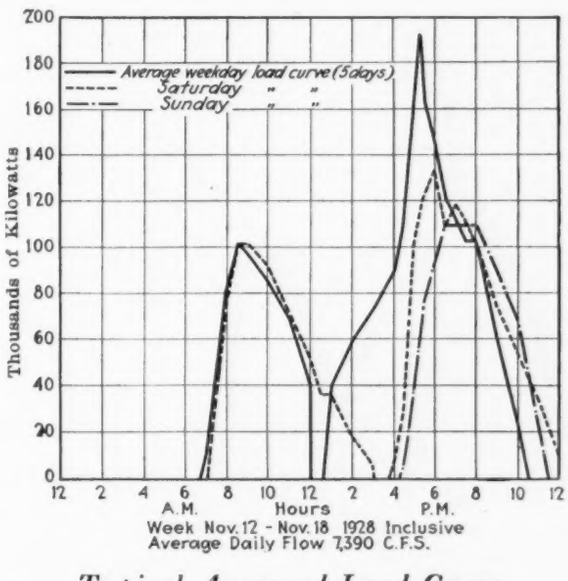
Above all, the public is entitled to the full use of electricity for its comfort and convenience and electric service should mean more than the sale of kilowatt-hours. The public is warranted in relying upon the agency that renders it electric service for all the elements that contribute to a complete national realization of electric service.

Conowingo Value Established as Peak-Load Station*

By R. Taylor and R. E. Turner
Philadelphia Electric Company

THE accompanying load curve of Conowingo is typical of the peak assistance the station is able to render to the Philadelphia Electric Company system. The week of Nov. 12 to Nov. 18, 1928, inclusive, was taken because of the comparatively low river flow, 7,390 c.f.s., during the period of the possible system peak. The week was considered as starting on Sunday midnight, Nov. 11, when the pond elevation was 107.76 ft. Weekly draw-down was made and also daily draw-down, bringing the pond elevation back the following Sunday midnight to 108.30 ft. The in-flow to Conowingo pond was a little irregular, being affected by Holtwood operation.

The weekday curve shown on the plot is an average of the five weekdays, which did not differ greatly from



Typical Averaged Load Curve for Peak Service (Conowingo)

each other, possibly the most notable difference being in the variation of the value of the peak, which ranged from 170,000 to 210,000 kw. This was most probably dependent on whether dusk came early or late. In addition to taking an average of 193,000 kw. on weekdays, Conowingo was also able to take a peak on Saturday, amounting to 134,000 kw., and on Sunday amounting to 110,000 kw., thus giving the steam supply practically a base load for that week.

By such operation (that is, weekly and daily draw-down), Conowingo was able to generate an amount equivalent to about 200,000 kw. steam capacity on a river flow which would, with 24-hour continuous operation, give less than 50,000 kw. As the system grows and the peak becomes sharper Conowingo will be able to assist the system considerably more, even when the river flow is low. Also, as the system grows, it will be able to utilize the full capacity of Conowingo the entire 24 hours during high-flow period.

**As indicated in the hydraulic power committee report of the Pennsylvania Electric Association, September, 1929.*

Economy of Buried Cable

Elimination of large investment for conduit line justifies trench method for transmission cable installation

By F. E. Smith

Chief Engineer Nebraska Power Company, Omaha, Neb.

A SAVING of about 40 per cent on an underground installation on the system of the Nebraska Power Company, Omaha, was made by the use of buried cable instead of the ordinary conduit construction. A substation serving a high-class residential district in the western part of the city had been fed by two 15,000-volt underground cables which came from the power house to within about 3,600 ft. of the substation, the feed over this distance then going overhead. Trouble, particularly lightning in the overhead section, usually took out both lines. The overhead construction was approaching the end of its useful life, and as improvement in service reliability was imperative it was decided to place the line underground all the way to the substation. The installation from the end of the existing conduit line is through a semi-residential district which is gradually developing into a secondary commercial area where underground service along the street will not be required or economical for many years. Consequently, the new underground installation could be regarded as simply an extension of the underground transmission system, with no considerations of underground distribution entering the problem.

A study of the ultimate requirements of the substation indicated that a final installation of from six to eight cables would be needed. An estimate was made for a nine-hole conduit line consisting of 4-in. fiber duct in concrete which would carry two 500,000-circ.mil, three-conductor lead-sheath cables for immediate use. The cost of this installation would be approximately as follows:

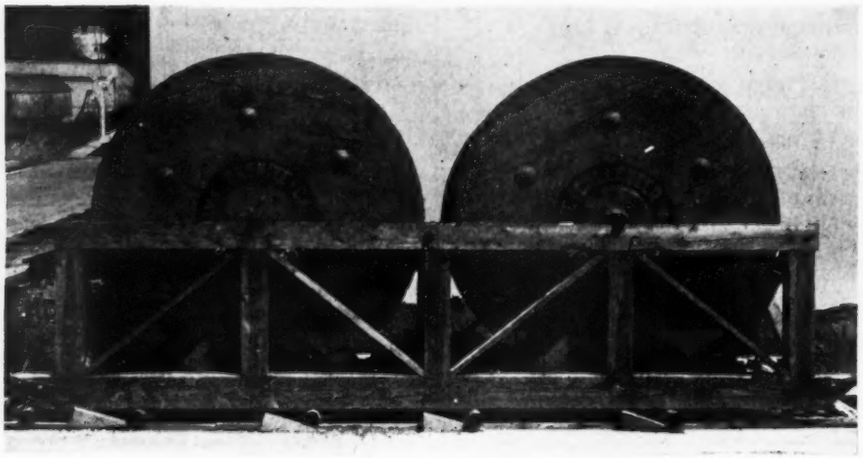
3,600 ft. of nine-hole conduit, including manhole and repaving, at $6 per foot	$21,600
7,320 ft. of 500,000-circ.mil, three-conductor lead-sheath cable installed, at $3.27 per foot	$23,936
Total cost of installation	$45,536

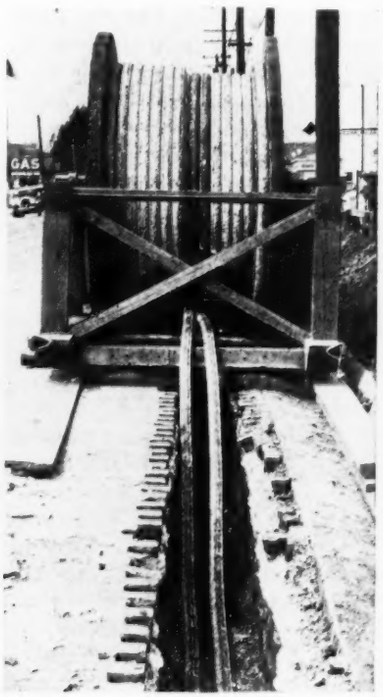
The improvement in service to this substation to be expected by the elimination of overhead lines would not justify this expenditure. Late improvements in the manufacture of underground cables, particularly in high-voltage paper insulation, caused thought to be given to the proposition of burying the cable instead of putting it in conduit. A very superficial study showed that there would be a considerable saving if armored cable were used, and it has been amply proved that the actual cost of the armored cable installation would be $26,862.40, or less than 60 per cent of the estimated cost of installing a conduit line and lead-covered cables. The items making up this cost are as follows:

Cable	$15,777.61
Cable inspection	222.20
Creosoted lumber	709.84
Splicing material	124.69
Miscellaneous	899.16
Labor	2,579.20
Estimated paving	3,469.40
Total, labor and material	$23,984.29
Engineering and overhead	2,878.11
Total cost	$26,862.40

Cable Laying Directly from Reels

The cable reels were mounted in tandem on a skid frame which was pulled along over the trench by a truck. As the cables paid off from the reels they dropped directly into the trench.





Considering the ultimate development of eight cables, it appears that the final installation would rather crowd the street. This would be true if it were necessary to carry all the cable in one street. However, this is not the case, as there are routes available so that it will not be necessary to put more than two cables in any street. Assuming the final investment for the armored cable will be $107,449.96, approximately four times the present cost, and that if lead-covered cable in conduit were used the cost would be $21,600 plus four times $23,936, or $117,344, the difference between these two final costs is in the neighborhood of $10,000, a saving which conceivably may disappear, due to the added expense of running the armored cable over four separate routes. However, if this saving does disappear and if the cost of the final installation of armored cable is equal to or even a little greater than the conduit installation, there will

even then be a major saving on account of the deferring over a period of years of considerable investment that starts at a low initial figure of about $22,000 and only gradually increases during the period. The additional fixed charges on the conduit installation, including interest, taxes and depreciation, over those for the two armored cables would be $2,380.88 each year, which compounded at 6 per cent annually would pay for a new armored cable every five years. It is thus apparent that the armored cable is of definite economy in this particular instance.

As for the installation itself, the cable is a 350,000-circ.mil, three-conductor, $\frac{1}{8}$-in. lead-sheath type insulated with $\frac{15}{64}$ in. of paper over each conductor and rated at 15,000 volts. Two layers of steel tape armor were used, covered with two heavy layers of asphalted jute. This cable, buried directly in the ground, will be rated the same as 500,000-circ.mil cable in conduit, this rating being permitted by the very good thermal characteristics of the soil. The cables are buried 1 ft. apart and 3 ft. deep and are thus above most of the gas and water services. The earth is tamped firmly around the cables and a 2-in. x 8-in. creosoted plank placed over each for mechanical protection and as a warning to any one working in the street. Manholes are installed every two blocks, approximately 750 ft. apart, for splicing the cables and offsets were made as the cable was laid to allow for expansion and contraction.

The cables were laid in the trench, not pulled into it. The two reels were carried on a large skid frame which straddled the trench and followed closely along as the excavation was made. This eliminated the necessity of opening a long section of trench and blocking cross traffic in the street and it also prevented abrasion of the jute covering and unnecessary bending of the cable during the installation. The cable parallels a street railway track throughout its length. However, no trouble from electrolysis is anticipated as joint work is going forward very satisfactorily toward the elimination of this effect in so far as possible.

Milliammeters Eliminated in Measuring Leakage Currents*

THE measurement of leakage currents usually requires a number of more or less delicate instruments in the way of milliammeters. Such equipment is quite often injured, or its calibration destroyed, by overcurrents when short circuits or ruptures occur during the test period. These troubles have been largely overcome by the use of a special current transformer consisting of modified standard parts.

This transformer is connected to the circuit where the milliammeter is ordinarily used. The transformer is so designed that the ordinary 5-amp. ammeter is used on its secondary.

The transformer core is that of a standard current transformer. Two primaries and a secondary of special winding are placed on this core. Primary leads are brought out through a high-voltage bushing containing a bakelite tube, the top of which supports a bakelite terminal block. The four primary leads are brought out separately to this block on which there are four terminals arranged for connecting the two halves of the primary coils in a series of parallel arrangement for changing the ratio.

Line terminal posts are bridged with a phosphor bronze strip gap between which a cigarette paper is placed for the protection of the transformer. The secondary terminals with proper taps for the ratios desired are brought out to five terminal posts, to which a 5-amp. ammeter is connected. The whole assembly is immersed in oil in a sheet steel tank and is insulated from ground for 25,000 volts on the primary side. Ratios chosen were 20 and 200 milliamperes to 5 amp. The unit measures 18 in. x $10\frac{1}{2}$ x $10\frac{1}{2}$ in. over all and weighs 58 lb., including oil.

The advantages of this equipment are to be appreciated in reducing maintenance and stock of milliammeters and the safety in being able to keep the high-voltage bus away from the instrument to be read.

Excerpts from report of the meter committee of the Pennsylvania Electric Association.

Selling the Inducement Rate to Customers

Introducing
7
and
5
THE ECONOMY TWINS
SEVEN cents and five cents are the two steps in the new domestic electric service rate of the Texas Power & Light Company. This rate now makes electric energy cheaper than ever before. You can use double the amount of electricity which you formerly used for only a small additional cost.
This new rate is composed of a moderate flat charge based upon the number of rooms in your home. Then for each room in your home you may use four kilowatt hours per month at a cost of 7 cents per kilowatt hour. For all kilowatt hours over four per room, you pay only 5 cents per kilowatt hour.
For instance, if you have a five-room house, you would pay 7 cents each for the first 20 kilowatt hours used, and 5 cents each for all additional kilowatt hours used. The flat charge for a five-room house is 70 cents. Suppose then that you used 25 kilowatt hours in one month. Your bill would be 70 cents plus $1.40 for the first 20 kilowatt hours, plus 25 cents for the additional five kilowatt hours, making a total of $2.35.
Now if you used fifty kilowatt hours your bill would only be increased by $1.25, making a total of $3.60.
That is why we call 7 and 5 the economy twins. They are just that to you. They make it possible for you to use all the electricity you want at a price which is by far the lowest in the history of electric service in this community.
Electricity can do countless things for you in your home. It can save time and strength and money for you. It can do your work in less time and with scarcely any effort on your part, so that you will have New Hours in which to enjoy living. And as electricity creates these new hours for you, it, at the same time, saves your strength and preserves your health so that you can take fullest advantage of them.
With "7 and 5, the Economy Twins," ready and eager to work for you in your home so cheaply, you should investigate the many things electricity can do for you. Let the "Economy Twins" work for you.
Texas Power & Light Company
"Your Electric Servant"

MERELY establishing an inducement rate will not increase the domestic usage of energy. The value of the rate has to be made apparent to every customer. The advertisement reproduced above is just one of several methods that the Texas Power & Light Company is applying to induce its customers to take advantage of the new rate promptly.

Utilities Need Code of Ethics*

Positive and constructive leadership awaited in the electrical utilities.
Individual efforts impaired by lack of industry policy.
Code of ethics proposed as first step toward goal

By WILLIAM E. MOSHER
Dean of the School of Citizenship and Public Affairs
Syracuse (N. Y.) University

I AM ready to subscribe to even the most extravagant claims which are advanced from time to time by those in charge of public relations as to the contributions that have been made to the social and economic well-being of the country. I can say with the most sincere conviction that the growth and stability of the electrical industry during the past twenty years is one of the most striking developments of an industrial epoch that has abounded in unparalleled achievements. As I look at it, the utility is just emerging from its pioneering stage. It has been engrossed in doing a tremendous job in record time. This has called for all the engineering and managerial ability and initiative that could be mustered. The task has been well done. The industry is well under way, but now the question arises, Where is it going? Your leaders of tomorrow must be able to stand apart from and above the absorbing task of producing and delivering kilowatt-hours or cubic-feet of energy so that they may define directions and goals, or, in academic terms, outline a philosophy for the industry and, what is more difficult see to it that it is generally adopted.

Individuals have already done that admirably. They have not alone found adequate expression for their high standards in words but they have translated these words into action. The material for a constructive program is at hand. But the task of having it accepted up and down the industry is, according to my layman's opinion, still to be done. Perhaps the most important handicap is the lack of a real *esprit de corps*. This handicap is only natural in an industry that has grown by such leaps and bounds. As evidence of this lack, I have heard more than one executive practically say, "I am not my brother's keeper." Or, as one of the high officials of a national association put it a year or two ago: "Every tub must stand on its own bottom." There spoke one who had the outlook of the pioneer. At that moment, at any rate, he was not thinking of the public utility *profession*—that is what I am really talking about—because one of the earmarks of a profession is that all are members one of another, and unworthy conduct on the part of one brings discredit to all, just as the worthy conduct of an individual increases the prestige of all.

This was surely brought home to the whole industry last winter when the Federal Trade Commission's hearings were being held. However *ex parte*—I believe that a fair-minded person will grant that they were *ex parte*—the conduct of these hearings may have been, and however successfully the responsibility for some of the practices which came to light may be localized, the shadow cast by these practices hovers over the whole industry and those associated with it to this day.

**Excerpts from an address, "Public Service in the Utilities—A Problem in Leadership," by Dean Mosher at the recent annual meeting of the Empire State Gas and Electric Association.*

HOLDING COMPANY POLICIES GREATEST PROBLEM

Economically the holding companies have more than justified themselves. If the policies and practices of the best of them prevail they will prove a blessing for all concerned, whereas if those of the worst gain the upper hand, or are not stayed, the doors will be thrown wide open to distrust, agitation, stringent regulation, any and all of which would interrupt the orderly and wholesome evolution of the industry.

> *Such evils as secrecy of accounts, unwarranted charges for managerial and other services, speculative purchases of operating companies at fantastic figures, inflation of base values by playing up good will, going value, overheads, and what not, stubborn opposition to public control, and above all, the pyramiding of financial structures that bewilders the most expert of accountants, are a menace to the good name as well as to the permanent well-being and progress of the industry.*

Perhaps the wizards of holding company finance have clearly in mind by what means they can honor the huge pile of promissory notes that are being written with such abandon in these days. If this is done to any considerable degree by the exploitative tactics mentioned above there will be the same indignant reaction that developed some years ago when railroad securities were made the football of frenzied finance. If, on the other hand, the holding companies adopt the commendable and eminently fair policy that has been sponsored by certain distinguished members of this association, namely, that the favorable results of amalgamations, technological advances and a broader market are to be equitably and automatically shared with the consumers, no question will be raised as to the fundamental integrity of this great enterprise, and, furthermore, no fear will be aroused as to the size of the amalgamations that are taking place and that in my judgment will and should ultimately result in a thoroughly integrated national organization of production and supply.

A person who thinks realistically, who attempts to see things as they are, can hardly question but that the industry must be looked upon as a unit, one comprising the small operating company as well as the huge holding corporation. What affects one affects all. You are

members one of another. If the utilities do not purge themselves of the above-named practices that appear in certain quarters the shadow to which reference was previously made may easily become a cloud that will cover the just and the unjust. Therefore, as never before, there is a demand for positive and fearless leadership, one with a capacity for a broad social conception of the goal and the purposes of the utilities, one endowed with the ability to state these aims in language that will command the attention and respect of the utility managers, the rank and file of the workers and the investing and consuming public.

Not long ago I participated in a discussion carried on by two men of wide experience in utility matters; both appealed to me as fair-minded. It was their judgment that no one within the industry would dare stand up and insist upon high ethical standards and condemn practices that are known to exist, because of the flarebacks that would come from his associates, his directors or his trade connections. Although my direct contacts with men in the industry do not bulk as large as theirs, I have gained the impression that the followership for a far-seeing and enlightened leadership is at hand when some one who speaks from an authoritative position is ready to draw up a code of ethical practice that will square with the best ideas and ideals that may be encountered among utility men. Such a platform and code will serve as a banner for the best spirits of the industry and at the same time as a guarantee to the public that a new order is being established in which mutuality of interest as between producer and consumer is positively affirmed. This is a most opportune time for imposing from within principles of conducting the utilities and all of their affiliations that will bring into harmony the purposes of public service and private profit in an unmistakable way. Those who have been in touch with other industries know that one of the most significant advances made since the war is the formulation of so-called codes of ethics. As some one has put it, "Business is now developing a conscience." No one will gainsay that there are in the utility business many such executives who carry on their business "with glass pockets," as the elder J. P. Morgan so aptly put it a number of years ago.

There are not a few organizations which expect the Public Service Commission to serve as their conscience. To them what the Public Service Commission permits or tolerates or fails to discover is right and fully justified in the interests of the stockholders. They share with the public what expediency as personified by the Public Service Commission dictates and no more. They reduce rates, it is true, but the amount of the reduction is determined not so much with reference to a just division of the savings due to new hook-ups and other favorable conditions as to reference to the necessity of keeping the Public Service Commission and the consumers quiet. The principle of mutuality of interest, which is simply another way of saying "partnership," does not determine policy; it is only incidental to it. But, fortunately for the industry and the consuming public, there are those in important positions who look upon their business not simply as one more type of business enterprise that offers rich opportunities for exploitation and profit taking. It is to such as these that public service is not merely a name to be exploited, but a mandate imposing well-defined obligations that permeate the whole conduct of their concern, whether it be a matter of the method of computing valuations, depreciation accounts, overheads, of devising rate structures or making provisions for relatively unlucrative extensions.

It is among this group that the leadership of the future will find its followership. It is with their aid that a code of ethics will be formulated and by means of their support that non-conformists will be brought into line. With the declaration of a public service policy by recognized leaders and the translation of this policy into day-by-day action criticism will be hushed and the problem of public relations will all but disappear. Then the *profession* of public utility management will be born.

> *" . . . the industry must be looked upon as a unit, one comprising the small operating company as well as the huge holding corporation. What affects one affects all."*
>
> *"There are not a few organizations which expect the Public Service Commission to serve as their conscience."*
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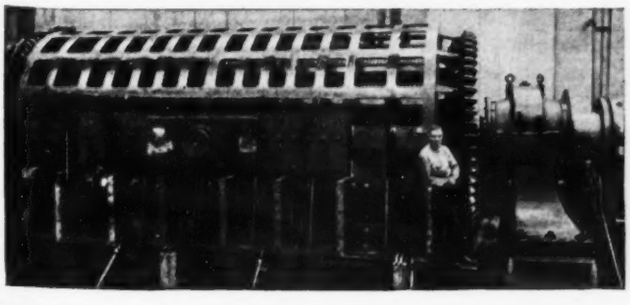
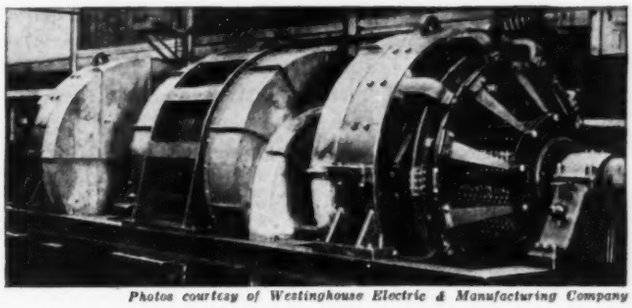
> *"With the declaration of a public service policy by recognized leaders and the translation of this policy into action . . . the problem of public relations will all but disappear."*

Welded Construction Popular in Electrical Field





Photos courtesy of Westinghouse Electric & Manufacturing Company

HERE are two examples of the extent to which welded structural steel is being used in place of castings for electrical machinery. One is the stator for the 13.8-kv., 1,800-r.p.m., 94,200-kva. Hell Gate generator. It weighs 40,000 lb. less than the equivalent cast stator. As a result it could be wound by the manufacturer and shipped as a unit. The 2,000-kw. synchronous motor-generator was built for the Carnegie Steel Company and except for the bearing pedestal welded steel is used throughout.

Selling Foot-Candles Instead of Watts*

Chain stores adopt a lighting maintenance policy which leads to an improved foot-candle standard of illumination

By Arthur A. Brainerd and W. N. Harrison
Philadelphia Electric Company System

THE idea of selling lighting on a basis of results secured rather than on the basis of equipment involved and current consumed is by no means new, but the actual sale of foot-candles regardless of equipment is a rare event. It has been the goal of lighting engineers ever since the metallic filament lamp made it possible to secure adequate illumination economically.

The Horn & Hardart Baking Company maintains a chain of 70 restaurants and retail shops in Philadelphia and vicinity. The term restaurant includes automats, cafeterias, sandwich shops, soda shops and luncheonettes. This firm requested the central-station engineers to address a group meeting of 150 of its executives on the subject of maintenance of lighting equipment. The meeting was remarkable in that from then on the company watched the condition of its lamps and equipment, in conformity to a definite schedule. Not only that, but the maintenance department formed the habit of consulting the central-station engineers on its lighting problems. It was inevitable that in some instances the wattage recommended for different locations should be called into question. The explanations brought out the desirability of classifying light intensities for different locations. In this connection a logical deduction was that it was of no value to know that the initial installation was up to standard if there was not some evidence that this condition was maintained.

A conference between company officials and the lighting service engineers of the central station was held, at which the background of the illumination tables was carefully discussed. Attention was called to the fact that illumination could be measured almost as easily as temperature; that it is as easy to check the performance of a lighting system as of a heating system. It was then agreed that all contact between the central-station lighting service and the restaurant should be delegated to one man and the Horn & Hardart Baking Company assigned one man to be thoroughly trained by this lighting engineer in the proper methods of maintaining a lighting system.

Complete Lighting Survey Required

A complete survey was then made of the entire property of the company, making a careful record of the lighting conditions and notes as to what steps would be necessary to bring the illumination up to standard. In many cases this survey showed that the existing installation was considerably above the average of its competitors. Naturally many locations disclosed some room for improvement. In many cases the addition of floodlighting and special outside lighting was found highly desirable.

The next step was to tabulate these results, indicating the correct foot-candle intensity with new lamps and freshly cleaned equipment. In addition there was made another column indicating the minimum intensity which would be tolerated. There was also a column indicating the increase in illumination necessary to bring this location up to the best standard practice.

The amount of light delivered was not the only result sought. Since this chain is fundamentally a retail selling organization, lack of glare, pleasing appearance and proper distribution were given due consideration in rating the installation in any location.

Having secured the necessary data the whole system of lighting and maintenance was placed on a business-like basis. As a first step in this procedure, the Horn & Hardart Baking Company purchased a foot-candle meter and assigned a man on its own force to have charge of lighting maintenance. This man was then thoroughly instructed in the use and care of the instrument and provided with a definite schedule, showing the reading stations, foot-candle intensities, washing dates, etc.

For several months this schedule has been in active operation and has resulted in a marked improvement in the appearance of the properties. The foot-candle intensity in every house is checked once each month after cleaning. Whenever the illumination intensity drops 20 per cent the lamps are renewed, whether burned out or not.

The major problem of bringing all existing properties up to present-day standards has been attacked systematically as follows:

1. The interiors are being improved, store by store, in accordance with the recommendations.

2. The windows and entrances facing the street are being equipped with decorative and display lighting, beginning, of course, with the stores on the main streets.

3. Floodlighting and other forms of exterior illumination are being installed wherever they can be used to advantage.

The total increase in load due to these changes is 58.1 kw., the average percentage increase in load necessary to bring houses up to present-day standards is 66 per cent and a total of 1,670 lamps have been replaced when foot-candle meter readings indicated that the useful life was over. The company in question is persuaded that the new policy adopted is showing a genuine return upon the investment.

In the past we have recommended and used ridiculously low lighting intensities for one reason and one reason only, and that is the cost of operation. We do not believe that, properly considered, initial cost of any lighting job has ever been a serious factor in the sale of proper lighting; it has been high initial cost in proportion to the results secured.

In this case, we have sold the idea of lighting as a co-ordinated system and not as a chance collection of standardized lighting units. The chain is being treated as a whole and the lighting equipment designed to fit the individual needs of the organization. When complete it will constitute a feature which is characteristic of this company.

We believe that in the future we should place more effort on selling lighting as a complete system, in the same sense that ventilating and heating is a complete system. The question of 15 foot-candles or even 50 foot-candles should not be open to arbitration when good engineering practice indicates such intensities to be correct.

*Excerpts from a paper of the same name presented at the recent convention of the Illuminating Engineering Society in Philadelphia, Pa.

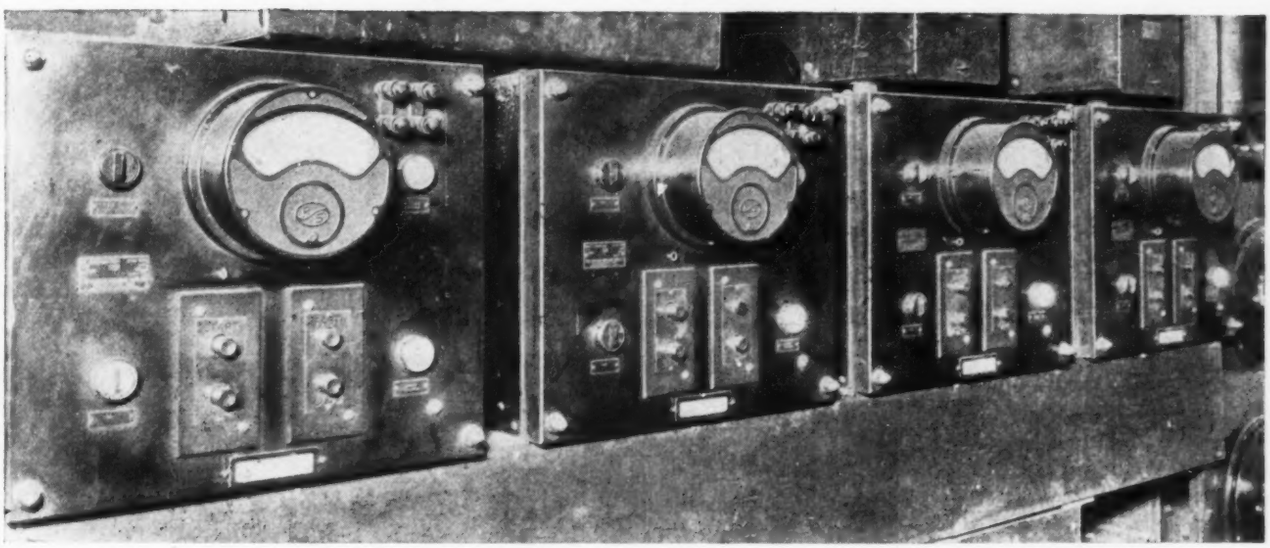
Fan Controls

Devised for Easy Operation

Drives for forced and induced drafts in large generating station are handled by control arrangements simple to operate and include visual indications of motor speed changes yet permit wide range of air velocities from fans

By R. G. LOCKETT

Electrical Engineer Cutler-Hammer, Inc., Milwaukee, Wis.



Two Induced-Draft and Two Forced-Draft Controls at Each Boiler

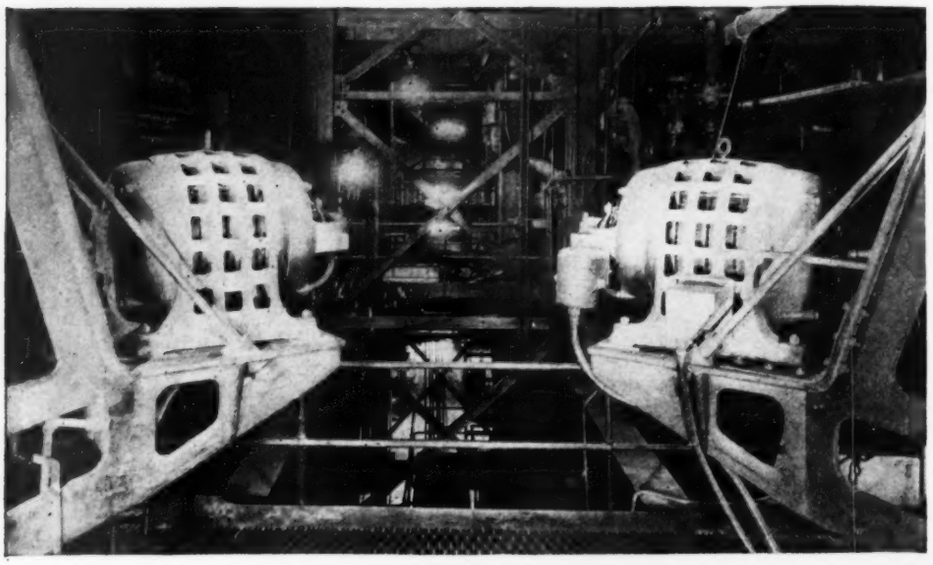
IN THE application of motors to forced- and induced-draft fans it is necessary to provide a wide variation in speed in order to meet the requirements of modern boiler room control. At the Waukegan station of the Public Service Company of Northern Illinois this control is from push-button stations mounted on the side wall of the boiler setting. The fans are driven by 2,300-volt motors equipped with metal-clad primary switchgear. Each of the eight Air Preheater Corporation's forced-draft fans is driven by a 100-hp., 1,200-r.p.m., three-phase, 60-cycle Fairbanks-Morse slip-ring motor, regulated from 550 to 1,165 r.p.m. Each of the four American Blower Company's induced-draft fans is equipped with two Fairbanks-Morse motors. On one end of the fan is a 125-hp., 514-r.p.m. motor and on the other a 250-hp., 720-r.p.m. motor. These two motors in combination make possible a 230- to 720-r.p.m. speed range. The combination of speed ranges and horsepowers used made it possible to design a drum type regulator that could be used on all these motors with minor variations in the pilot segments only.

In a room in the basement below the boilers are located the sixteen motor-driven drum controllers that are operated from the four groups of control panels mounted on the boilers. With this arrangement all of the electrical equipment except the motors themselves is kept away from the ash and coal dust of the boiler room. The resistor leads are kept short and yet the drums, resistors and resistor leads are quite accessible.

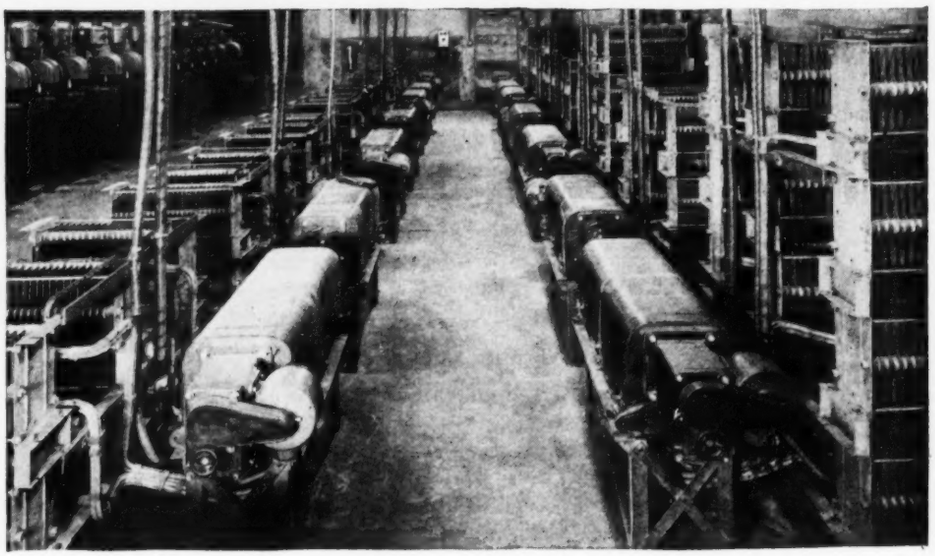
A somewhat similar set-up is used in connection with the double motor drives as with the single motors and only the latter will be described in detail here. Reference to the accompanying illustration will show that each control station is equipped with four push buttons and four bulls-eye lamps and an ammeter. On one side of the panel the push buttons are labeled "start" and "stop" and on the other side "fast" and "slow." The bull's-eye on the top left-hand side is red, the one just below it is green and the two on the right-hand side are white.

With power on the 2,300-volt feeder line the green lamp is lighted, showing the motor is ready for operation. By pressing the "start" button the primary switch is closed and the motor starts up at its slowest speed. The red lamp now lights up, showing that the motor is in operation, the green light disappears and the bottom white light comes on, showing that the motor is operating on the first speed point. If the "fast" button is pressed the pilot motor on the controller begins to drive

the drum, resistance is cut out and the motor speeds up. Each time that the controller strikes a speed point the upper white light on the control panel lights up, and as the drum reaches the second speed point the lower white light goes out. The operator, therefore, has a visual check on the operation of the controller as the number of flashes indicates the number of speed points passed over. If the button is held down the controller will eventually cut out all of the resistance, at which point the lower white light comes on again, and when both white lights are lighted this indicates that the motor is operating on the maximum speed point. When the "stop" button is pressed the controller pilot motor automatically brings the controller back to the starting point. When the "slow" button is pressed the motor is slowed down, in a manner similar to that described above for increasing speed, and the lights flash in the same way until the first speed step is reached. In case of a voltage failure the controller is also automatically returned to the off position.



Forced-Draft Motors Are Mounted on Brackets Attached to Fan Shells



Motor-Driven Drum Controllers and Secondary Resistors for Draft Drives

At the left are the armor-clad motor switches.

An even wider range of speed is required in connection with the operation of the induced draft fans and the horsepower required varies in proportion to the speed. In order, therefore, to operate efficiently through the low speed range the drive is split into two motors so that the 125-hp. motor drives the fan through the lower speed range from 230 to 490 r.p.m., and then as the speed is increased the load is taken up by the 250-hp. motor through a range from 490 to 700 r.p.m. The application of the two motors is a comparatively simple problem, but the control equipment required to carry out the speed changes and the shift from one motor to the other becomes rather complex. On the two-motor fans the control automatically transfers from the small motor to the large as soon as the controller drum for the small motor reaches the limit of its travel. The controls are arranged to bring the fans to full speed in about 30 seconds if desired. The regulating resistor provides sufficient torque for starting without special accessories and the large motor on the two-motor drive can be started from rest if necessary. Ordinarily it takes over the load after full speed is reached on the smaller motor. Thirteen speed points are provided for each motor, the upper six points being three phase or balanced. The lowest seven speed points are obtained by commutating single-phase resistor sections successively.

A manually operated control transfer switch mounted on the control relay panel allows the high-speed motor of the two-motor combinations to be operated alone when necessary. Each induced draft fan control station is likewise equipped with the red, green and white lamps for flashing in various combinations when the speed changes are made and which show at a glance whether the lower or the higher speed motor is carrying the load. The system has been so worked out that it is practically foolproof and impossible for the operator to make a mistake in the operation of the draft fan equipment.

The two white lights are used in a novel way to indicate speed points and drum position. One light is illuminated on each point, except the first, and the other is illuminated on the two extreme positions only.

Are CURRENT PRICES *Justified?*

By H. M. CAMERON
Associate Editor "Electrical World"

Is the current utility market just a speculative orgy or are buyers adjusting their requisites with regard to yield on common stocks?

ARE public utility stocks too high? Do earnings either actual or immediately prospective justify present levels? Is the normal growth of the industry ample to explain the enormous rise in the price of securities during the past two years? These and similar questions are being pondered by thousands of investors, as well as by many of the utility executives themselves. Whether the limit of safety has been reached and whether or not further material appreciation involves danger to the industry is a matter on which authoritative opinion is not unanimous. Expert opinion can be found to support the view that present prices are dangerously high. The view that we are in a long bull market and that the viewpoint of the buying public with regard to earning requisites has been radically adjusted has many supporters. In the opinion of many executives this is a situation which requires the serious thought of the industry.

That there is doubt in the minds of executives with regard to the market situation is soon learned from conversation with any representative group. Six months ago a prominent utility president, asked by the writer for his opinion of the current price of his company's common stock, expressed the opinion that it was much too high at 30. It recently crossed the 100 mark. There are many in the industry, especially of the more conservative school, who feel that the future is being discounted much too far in advance.

Certainly the market is entirely out of line today if we adopt the older standards which seemed dependable less than a decade ago. Within that period it was regarded as normal that a stock should sell somewhere around ten times its annual per share earnings. It would be difficult today to find an active listed public utility common stock selling at less than eighteen or twenty times its earnings, and a great majority are well above this. A well-known and actively traded utility stock listed on the New York Stock Exchange earned less than $1.25 per share in 1928, pays no regular dividend and is selling over 150. A representative group of utility operating companies shows present prices on the average to be more than 30 times earnings. The same ratio of a representative group of holding company stocks shows the average to be almost 33 times earnings.

UTILITY RATIO IS HIGH

Comparison of a representative group of utility stocks with a group of industrials and rails indicates that the ratio between the selling price and earnings is decidedly higher, on the average, in the case of the utilities. Without pressing the comparison, there are certain factors affecting the utility situation which should be noted.

The most obvious reason for the rapid appreciation in utility stock prices is the steady enhancement in the volume of available capital. National statistics show greatly enlarged personal purchasing power in addition to the tremendously expanding buying on the part of institutions such as the investment trusts. Along with this increase in available capital the investor has gradually been placing more importance upon appreciation and less upon yield, with the result that the relation between selling prices and earning power is virtually lost sight of.

This last factor has been especially potent in the market of the past ten or twelve months. In addition to the strong so-called Hoover market, which had been predicted, there seems to have been an unexpected increase in investing power over the country in general. A study of the brokers' loan situation seems to indicate that what

	1924			1925			1926			1927			1928				
	Earned per Share	Average Price	Times Earnings	Earned per Share	Average Price	Times Earnings	Earned per Share	Average Price	Times Earnings	Earned per Share	Average Price	Times Earnings	Earned per Share	Average Price	Times Earnings	Present Price Oct. 10	Times 1928 Earnings
American Water Works & Electric	$2.85	33	12	$3.56	55	16	$5.47	58	11	$2.79	59	21	$3.50	64	18	$3.50	176	50
Commonwealth Power				2.61	37	14	4.13	36	9	4.36	63	14	5.62	86	15	5.62		
Middle West Utilities Company	4.69	67	14	7.64	103	13	5.87	121	20	8.21	117	14	8.33	151	18	8.33	450	54
Public Service Corporation of New Jersey	6.59	54	8	6.30	75	12	2.44	32	13	2.21	39	18	3.28	62	19	3.28	122	37
North American Company	3.16	33	10	3.12	58	18	3.85	55	14	3.86	55	14	4.51	78	17	4.51	161	36
Commonwealth Edison	10.72	132	12	11.13	136	12	11.49	139	12	12.59	156	12	12.33	192	15	12.33	388	32
Consolidated Gas of Baltimore	4.87	33	7	6.41	40	6	5.64	51	9	4.62	61	13	5.49	81	15	5.49	130	24
Detroit Edison Company	9.98	108	11	10.68	135	13	11.32	132	12	11.32	152	13	12.24	195	16	12.24	365	30
Public Service Company of Northern Illinois	11.63	106	9	11.91	119	10	12.91	134	10	13.72	146	11	13.77	182	13	13.77	355	26
Southern California Edison	3.89	101	26	10.84	125	12	2.94	32	11	3.20	38	12	3.09	50	16	3.09	84	27

profit taking is going on from time to time does not reduce the volume of credit required for the floating stock, but seems rather to increase it.

Looking at the situation from the standpoint of the intrinsic value of the utilities, it is beyond doubt that much of the rise has come from increased public appreciation of their inherent stability and future earning power. These securities are just now receiving the public recognition which they deserved long ago and which places them in a position comparable with the railroad securities because of their relative immunity from general business disturbances.

From the standpoint of their earnings, it is important that there is an expansion of 8 to 10 per cent annually in normal earnings, apart from the enhanced value added by mergers and consolidations. The latter, of course, is obviously inadequate to explain the entire increase in prices, since many stocks have not been affected by mergers and have appreciated relatively with the others. Furthermore, it should not be lost sight of that apart from normal dividends many of the utilities have issued warrants and rights, which, if included in yield, as they properly should be, would bring the ratio between the market price and earnings down materially.

Viewpoint on Yield Has Changed

Very little thought is necessary to see that the viewpoint on required yield has become entirely altered, at least with the majority of investors. That 6 or 8 per cent on the average was required by the bulk of investors five years ago does not by any means prove that a stock which yields less is selling out of line today. There is decidedly less emphasis on yield on the part of speculative and semi-investment buyers. Supply and demand are still the dominant factors in the determination of price, but the ratio between these two has been changed by the enormous volume of available funds already referred to, and undoubtedly also by the increase in the gambling instinct on the part of the average American investor. Analysis of the yield on a representative group of almost 30 public utility holding companies shows an average of 2 per cent, and only slightly more for a representative group of operating power and light companies. In this particular holding company list several of the companies show no dividends and several show a yield of less than 1 per cent. It is fairly obvious that such stocks are not purchased for yield.

With regard to the attitude of the buying public, there are two possible conclusions. One is that the market for utility securities is a purely speculative market; that the buying public cares nothing for minute analyses of earnings position, and will probably continue to discount the future far in advance. The other is that buyers of these securities are willing to gamble on the probability that the public service commissions will continue to refrain from intrusion in the direction of attempting to force a more rigid ratio between market price and valuation through the establishment of "fair value of property" rate bases.

The general conclusion to be made is that present prices are not justified in terms of present earnings, but that the future prospects are primary considerations in the minds of investors. It must be noted that the market supply of many utility stocks is limited and that the demand for these stocks is widespread. The utility holding companies themselves have adopted a partnership basis of stock division by forming a top holding company and no one of the interested holding companies will release any of its share of parent stock lest it lessen its share of control in subsidiary properties.

Add to this situation the fact that many purely investment trusts have been organized recently and have bought utility stocks on the market—most of the buying has been into the same utility companies. On top of this the public is buying utility securities on the market. None of these buyers will readily dispose of the stock holdings because of the generally favorable utility situation. Thus the stock supply is limited and the buying power unlimited and a rapid appreciation of stocks occurs. Despite this artificial situation between prices and earnings, there is no indication apart from present market uncertainty of instability and no indication that large amounts of stock can be dumped on the market suddenly. A great change in the national business situation would be necessary to cause a market crash, and this is not on the horizon. In the meantime business is good and earnings on the up-grade, thus helping to work out a serious situation.

Street Lighting Financing Made Easier*

By W. T. Blackwell and H. W. Hardy
Public Service Electric & Gas Company, Newark, N. J.

A PLAN has been developed in Public Service territory which makes possible improvements in street lighting even when no provision has been made in the municipal budget for such improvements. It is known as the Paterson plan, since it originated in the city of Paterson. Wherever a street business association or group of merchants desires higher intensity street lighting than that normally provided by the city it presents a petition to the city council asking for such improvements and signifies its willingness to have the assessed value of the benefited property increased sufficiently to bring into the city treasury the necessary funds to pay for the improved lighting. The association collects from its members and presents to the city a sum sufficient to pay for the increased lighting from the time the improvement becomes operative until the increased assessments are made, generally the first of the following year.

The uniform street lighting plan is an outgrowth of the Paterson plan. This plan applies, as a rule, only to the business area of a municipality. The plan derives its name from the fact that uniform posts, spacing, equipment and lamp sizes are employed. It calls for uniform improvement all over the area under consideration. The plan, which is prepared by the company's lighting representative, is fostered by the local Chamber of Commerce, which carries on the contacts with the municipality and the merchants and property owners along the streets to be relighted, aided by the lighting representative.

Both the Paterson plan and the uniform lighting plan are of recent development and have not been in use long enough to make many definite statements as to their faults or merits. However, it is known that the Paterson plan has been used successfully in several instances in two cities and that the uniform plan is in use now to improve 64 blocks of street lighting in Patterson. The increased assessment will average not more than $1 per front foot per year.

**From a paper, "Promotion of Street and Highway Lighting by Central Stations," presented at the recent convention of the Illuminating Engineering Society.*

Japan—A Leader

in Electrical Development

"MORE than 90 per cent of the buildings in Japan are lighted electrically," said H. Ihara, director of the Miegodo Electric and Hiroshima Electric companies and vice-president of the Electric Association of Japan, while in New York recently. "This does not mean that adequate use is made of electric energy, for many small dwellings have but a single lamp, although the average is between three and four, and our problem at present is to find new outlets and uses for light and power and to study new transmission and utilization factors. This extensive availability of electrical energy has been made possible by the short distances that are, in general, involved and the high concentration of population. It is true that construction costs are lower in Japan than in the United States, but rates are higher. Residential lighting service is sold for approximately 30 cents per connected lamp per month up to a load of ten lamps. Above that number metered service is provided for about 15 cents per kilowatt-hour. Power rates begin at 7½ cents a kilowatt-hour.

R. Musha, H. Ihara and Hyoza Miyata

"Hydro-electric developments have been pushed to the utmost," continued Mr. Ihara in response to an inquiry, "and according to our estimates Japan has developed and is using a greater percentage of her natural water power for generating electrical energy than any other country, which accounts for the desire to seek new uses and new developments. As in the United States, the seasonal flow of water requires adequate steam reserves and steam plants are by no means of minor importance in generating for normal requirements. Transmission lines connect the systems of independent operating companies, the average being at 66,000 volts, although a maximum of 150,000 volts is used."

Mr. Ihara heads a party of seventeen executives of the largest power and manufacturing companies who constitute the Japanese Lighting Mission as official representatives of their nation at the Dearborn celebration of Light's Golden Jubilee. The party has been reviewing engineering and commercial practices in this country. When interviewed by a representative of ELECTRICAL WORLD during their visit to the Westinghouse Lighting Institute in New York it was asked what efforts were contemplated to build up the use of the service which is so generally available. Mr. Ihara said:

"Both the power companies and small dealers sell appliances and lamps. We have a lighting institute of our own. But as we do not encounter the same pressure to reduce rates that you do here our problem is somewhat different. Greater use of energy will of course accompany some reductions, but our efforts have been largely devoted to making service available to every one. Incidentally, that is one reason why our generating stations are of far smaller capacity than yours are here, for the general distribution of our load, without any considerable number of large buildings or great load centers, dictates less concentrated development. The largest plant in Japan is of 200,000 kw. capacity. We are constantly on the lookout for the most advanced engineering equipment and obtain it as promptly as possible."

R. Musha, managing director of the Keijo Electric Company, Ltd., in discussing hydro-electric developments called attention to the water-power project in Korea, involving a long tunnel through a mountain and the withdrawal of water from virtually inaccessible country to supply an 18,000-kw., 3,000-ft. head plant. Automatic operation has been utilized in so far as possible.

"Light's Golden Jubilee has caught the imagination of our people," said Hyoza Miyata, managing director of the Kyushu Electric & Railway Company, another of the more prominent members of the commission, "and our celebration is to be held simultaneously with yours. Light will be the dominant element in the festival, although pageantry and unilluminated displays will also be used. The jubilee will be quite generally observed, for not only the power companies but schools, civic organizations and municipalities are co-operating. We are pleased to offer our appreciation of the gifts of Mr. Edison."

Other members of the party are: T. Hata, chief engineer Niigata Hydro-Electric Company; S. Kunitomo, managing director Chuo Electric Company; K.

Murakami, director Kyushu Hydro-Electric Company; W. Mori, business manager Toho Electric Power Company; K. Ogata, business manager Kumamoto Electric Company; B. Sakaguchi, director Hiroshima Electric Company; F. Sato, chief engineer Osaka Electric Power Company; K. Sugiyama, engineer Tokyo Electric Light Company; K. Takechi, manager Iyo Electric Railway Company; M. Yamashita, Bureau of Electricity, Osaka Municipality; M. Kihara, director Teikoku Rengo Lamp Company; F. Nishida, general affairs head Osaka Lamp Company; K. Sakai, Tokyo Electric Company, and H. Parce, Tokyo Denki Company. I. Kabayashi, special representative of the Westinghouse Electric Company in Japan, was also present.

Letters from Our Readers

Defends Franklin Specification

To the Editor of the ELECTRICAL WORLD:

My attention has been called to an editorial on the "Franklin Specification" which appeared in the Sept. 7 issue of the ELECTRICAL WORLD. As one who took part in the preparation of this specification, I am naturally strongly interested in any opinion which carries the prestige of such an influential publication as the ELECTRICAL WORLD. Since this specification represents the concentrated efforts of most of the leading illuminating engineers of the United States, who have worked for a considerable time, even the casual observer must know that the objections which this article raises have many times been the subject of careful consideration.

I am particularly disappointed in your analogy between light and temperature. The proper temperature for the human body depends on a variety of conditions, such as the weight and character of the clothing worn, the amount and intensity of physical activity, humidity, and several other variables. For instance, a man engaged in fast tennis playing could easily develop perspiration at a temperature as low as 50 or 60 deg. So, in lighting, the amount of illumination required for a given condition depends on several other factors, such as appearance and conditions of surroundings, size and material of the objects viewed, etc. You called attention to the variation and recommended a range of 25 to 100 foot-candles. This range is made for two conditions only, local lighting of paintings and special museum exhibits. Such exhibits cover the entire range of color from white to black, and the possible character of the surrounding conditions are too numerous to mention. But in any case the amount of light actually coming into the eye for satisfactory illumination is approximately the same.

Naturally, whole books could be written on a subject as intricate as this. I merely cited this instance to show that what is apparently inconsistent is really not at all what it appears.

So far as experts disagreeing on a specific condition, it has been my fortune to be connected with quite a number of scientists and engineers who are investigating the effect of light on the eye and health, etc. They have done, and are doing, excellent work, but there are many of the necessary facts in illumination to which scientists have as yet no definite answer. The "Franklin Specification" is the result of such engineering investigations and, I believe, as such should receive the enthusiastic support of every interested authority and be used as a guide until the scientific investigation can give us more complete information.

ARTHUR A. BRAINERD,
Philadelphia Electric Company, Illuminating Engineer.

Favors Criticism Because It Clarifies Thinking

To the Editor of the ELECTRICAL WORLD:

The editorial in the September 7 issue of the ELECTRICAL WORLD on the "Franklin Specification for Illumination Intensities" gives a critical view of the specification from the standpoint of intensities. This criticism is correct in assuming that, to one capable of interpreting the range of intensities beyond the minimum, such general recommendations are not necessary and that, to others, they are misleading and do not guide. The intent of specifications is to guide and specify, and therefore generalities, should be avoided.

The range of lighting intensities has not the narrow limits of comfortable temperatures as applied to heating systems. The psychological reaction to light is a result of the surroundings as a whole; i.e., color and form. Therefore, for the guidance of those who are not illuminating experts, a specification on intensities if defined in terms of foot-candles is misleading and confusing. A table of ranges for definite or similar cases might be given, but even that would be misleading. Instead of specifying intensities, a general table of known ranges used in examples of good lighting might be more of a guide than a recommendation and, therefore, be much less confusing. For specific layouts, the architect would have to consult with the illuminating engineer so that each will know what are the requirements and what is necessary to produce the result desired.

The editorial referred to will undoubtedly be severely criticised by those who think in figures and by those who do not consider that lighting effects are the result of color and form as well as of intensities. The editorial is severe, but, like all positive actions, the results will be positive at least and contribute to the better understanding of the purpose of the Franklin specification, due to the discussions which will follow.

H. G. DAVIS.
The Frink Corporation, New York, N. Y.

Claims Modified Hollow-Square Busbar Not New

To the Editor of the ELECTRICAL WORLD:

I am much interested in the article in the September 21 issue of the ELECTRICAL WORLD, on page 569, on the subject of "Current-Carrying Capacity of Busbars." A statement in the early part of the sixth paragraph regarding devising an arrangement of strap conductors, grouping them into a modified hollow square, might lead readers to believe this was something new. This was probably not the intention of the author.

This so-called modified hollow square arrangement was first suggested by the writer and has been used by the General Electric Company for many years.

The findings of Mr. Pabst are in general accord with ours. As indicated by Mr. Pabst, a specialist would be able to recommend a modification of the hollow square arrangement so that currents over 6,000 amp. can be properly carried.

S. W. MAUGER,
Assistant Engineer Switchgear Department.
General Electric Company,
Schenectady, N. Y.

Digest of Electrical Literature

Generation, Control, Switching and Protection

Relay Protection for Power Systems.—W. F. MAINGUY.—It has been the endeavor of the author to develop such generalizations as may be useful in connection with relay practices with particular consideration for over-current, directional and differential protection. The difficulties encountered in securing satisfactory relays and the particular applications to which certain types are adapted have been covered.—*Electrical News and Engineering (Canada)*, October 1, 1929.

Testing High-Capacity Oil Switches.—C. J. WEBB.—A description of a recently constructed oil-switch testing laboratory which has been designed on a comprehensive scale to permit thorough investigation of both principles and equipment. The installation includes a three-phase alternator with a continuous capacity of 50,000 kva. and designed to give 6,000 volts at a normal output of 4,800 amp. This machine will withstand excess excitation of 50 per cent, so that considerable power can be generated at 9,000 volts. The voltage-raising transformer and the motor-generator are located in a special room and are supplied by a 100,000-volt transmission line specially erected. Wiring diagrams have been included. The test yard has been laid out with the object of providing a maximum safety for the staff and the adjacent buildings. Details of the protective layout have been included. In testing the high voltage the generator is started by means of an auxiliary gear and then driven at 1,500 r.p.m. by the motor. The exciter is then switched on. If the test is to be made at a voltage different from that of the generator the step-up transformer is put into circuit. By means of a remote control the motor is then switched off and a short circuit created by closing the generator switch, which action closes the oil switch under test to function and break the circuit. The power available is such that oil switches of practically the largest sizes in modern use can be tested adequately.—*Electrical Review (England)*, September 6, 1929.

Heat Application and Material Handling

Fusion-Welded Pressure Vessels.—The technical report for 1928 of the British Engine Boiler and Electrical Insurance Company has been almost entirely devoted to the fusion welding of pressure vessels and this article offers a résumé of the findings and conclusions. A number of various types of welded joints have been analyzed and their advantages and disadvantages pointed out. It is stated that although it is possible to produce a butt joint the strength of which when reinforced is equal to or even slightly greater than that of the plate itself, there are so many uncertain elements in a welded joint that under no circumstances can a butt-welded joint be credited with more than half the plate strength. The valuation of the various types of welds is interesting and a number of desirable characteristics for metallic electrodes for welding purposes have been enumerated.—*Engineer (England)*, September 13, 1929.

Transmission, Substations and Distribution

Large Water-Cooled Transformers.—Water-cooled transformers for a South American development have recently been provided by an English manufacturer. A number of interesting features distinguished them, such as an unusual water-cooling system involving a coil of seamless copper tubing, arranged in sections, and so located inside the upper portion of the tank that the transformer may be withdrawn from the tank without in any way disturbing the coil; an electric alarm system connected to give warning of inadequate cooling media, and transformer units fitted with temperature indicators which refer to the hottest part of the winding by means of an element external to the winding itself operated through a current proportional to the load current.—*Electrician (England)*, September 6, 1929.

New Formulas for Main Dimensions of Transformer—H. BUCHER.—The author has endeavored to develop new, fairly accurate formulas to simplify the design of the least expensive transformer; that is, the transformer with a minimum of iron and copper. Different equations are developed for the various types of transformers, such as core type, shell type, disk and cylinder coils. The method does not use the hitherto generally assumed ratio constants of iron-weight/copper-weight and window-height/window-width. A perusal of the author's method indicates, however, that it would not be applicable to transformer sizes in excess of about 250 kva. For a first approximation of main dimensions of distribution type transformers the new method is a useful short cut.—*Elektrotechnische Zeitschrift*, September 5, 1929.

Unappreciated Economies of High Voltage.—A. M. TAYLOR.—An attempt to take proper cognizance of the effect of "earth drop" and internal drop, per kilowatt transmitted, when comparing the relative advantages of electric power transmission at high and low voltages. The author has included a number of charts and curves to indicate the elements entering into this discussion and points out that the effect of "earth drop" when added to the other advantages of high-voltage transmission makes this procedure highly desirable. It is stated that the waste energy saved by employing high voltage will pay for the replacing of the cable every fifteen years or so, or, in other words, will pay for perpetual maintenance. The increased carrying capacity at high voltages is another factor to be considered.—*Electrical Review (England)*, September 13, 1929.

Motors and Control

Latest Austrian Rules on Squirrel-Cage Motors.—A. VELISEK.—The general use of squirrel-cage induction motors on European systems is highly restricted, due to alleged voltage disturbances on distribution systems from the starting of such motors. On the Viennese (Austria) system, for example, no such motors of more than 2 hp. were permitted, and from ¼ hp. on all of them had to be started with a star-delta switch. These over-conservative rules have now been greatly modified, and the Vienna municipal system issued a recent statement that from now on a squirrel-cage motor can be used in any size wherever a wound rotor had to be considered previously, provided the momentary starting inrush current does not cause a voltage drop in excess of 3 per cent. This opens the field for an extensive use of the simpler, smaller, less expensive and more efficient induction motor with either a cast rotor or a double slot motor, and for particularly heavy starting duty for motors of either type with any one of the many available automatic clutch pulleys.—*Elektrotechnik und Maschinenbau*, August 25, 1929.

Electric Drive of Centrifuges.—S. HOPFERWIESER.—Starting large and heavily charged centrifuges, such as are commonly used in sugar refineries, represents a considerable problem for direct motor drive. Direct current and plain induction motors are not suitable for this purpose, but wound rotor three-phase motors with a resistance starter have long been used. Even with this type of motor, however, a slip-clutch had to be introduced between the drum and the motor. The combined manipulation of starter and clutch, the uncertain grip and the wear of the latter were grave disadvantages and jeopardized reliability. This article describes a newly developed automatic starter which can be combined with a wound-rotor three-phase motor, driving the drum directly without the interposition of a clutch. Several centrifugally operated contactors short circuit more and more of the rotor re-

sistance as the motor increases in speed. A hand-operated brake band serves to stop the motor quickly. For starting the motor the attendant merely closes a three-pole switch. Although the starting current is but 1.6 times the rated running current, ample torque is developed to insure quick acceleration. In a large sugar plant 52-in. centrifuges, equipped with this automatic starter, handle as high as sixteen charges per hour.—*Brown, Boveri Mitteilungen*, September, 1929.

Traction

Railway Electrification in France.—H. PARODI.—An outline of the generating facilities devoted to the supply of energy for the electrified railways of France and of the various items of equipment entering into the supply and utilization of power. The engineering features have been reviewed in general and certain statistics regarding the various phases of power application included. Some of the elements which entered into increasing electrified lines are likekwise reviewed, as are the operating and mileage elements.—*Electrical Review (England)*, September 13, 1929.

Miscellaneous

Properties of Modern Porcelain.—H. HANDREK.—Porcelain as used today in the manufacture of insulators represents a highly developed, perfectly controlled and electrically and mechanically well-defined material, according to the author, who is connected with one of the largest European ceramic plants. This article gives a survey of the characteristics of electrical porcelain, containing valuable and little known details. Puncture strength can now be guaranteed up to 36 and even 40 kv. per millimeter thickness. Glazing has no effect upon this value, neither have temperatures up to 120 deg. C. Beyond about 200 deg. C. the puncture value drops rapidly, reaching about 1 kv. per millimeter at 500 deg. C. The dielectric constant varies between 5.5 and 6.5 at 50 cycles and about 2 per cent less at 800 cycles. The dielectric loss figure lies usually between 15/1,000 and 30/1,000 at 50 cycles and drops slightly at higher frequencies. The surface resistance depends largely upon ambient humidity, dropping rapidly at 50 per cent humidity from an exceedingly high value (more than 350×10^3 megohm on a telegraph insulator) to only a few megohms at 80 per cent humidity. The surface glaze has not the great influence upon these values that it is generally assumed to possess. Tensile strength of porcelain varies according to its cross-section between 550 to 250 kg. per square centimeter, while compression strength is about ten times as much. Bending strength lies between 800 and 200 kg. per square centimeter cross-section, torsion strength 420 to 190 kg. per square centimeter.—*Elektrotechnische Zeitschrift*, September 5, 1929.

High-Power and High-Voltage Laboratory.—J. BIERMANNS.—It might be contended that new electrical problems, such as are faced in the design of unusually large machines, or on apparatus for unusually high voltage, should be left for their solution to scientific bodies rather than to the manufacturing engineer. Past experience indicated, however, that the pure scientist neither stands closely enough to the requirements of industry nor has he, as a rule, sufficiently large equipments at his disposal to carry on his investigations on a modern manufacturing scale. Extrapolations of findings on a small scale, assumed to hold true on a much larger scale, are seldom correct. Realizing the above, a large German concern has recently finished a factory testing laboratory which is probably the most elaborate and powerful one on the continent. A 100,000-kva., three-phase short-circuit generator, in connection with a 100,000-kva., low-reactance transformer supplies energy for the high power testing of electric machines, particularly circuit breakers. Such tests, which are usually carried to destruction, are made in two deep pits and are observed through mirrors. For tests with extremely high voltage, a 1,000-kva., one-unit million-volt transformer is available. A Tesla coil for 1,000,000 volts at 50,000 cycles and an impulse condenser battery for 2,500,000 volts are installed in the laboratory. A 300-kv. transformer with power rectifying tubes furnishes high-voltage d.c. A cathode-ray oscillograph, a Schering bridge and a closely controllable water spray apparatus are other noteworthy parts of the equipment.—*Elektrotechnik und Maschinenbau*, August 18, 1929.

Book Reviews

Year Book of the Czechoslovak Electric Association, 1929

V. Ptácek, editor. Prague XII; Vocelova 3—Elektrotechnicky svaz ceskoslovensky. 296 pages, two colored supplements, five maps.

The present Year Book is the fourth volume published since 1926 and was compiled by experts in co-operation with official corporations, ministries and state authorities.

It commemorates the tenth anniversary of the Czechoslovak Republic and the E.S.C. by describing the evolution of the latter and work performed by it during the first ten years of its existence. When founded its membership amounted to 400, now increased to 2,700.

The general section of the publication contains diagrams pertaining to the economic situation, maps and reviews of foreign trade, prices of metals, machines and apparatus, statistics covering the Czechoslovak electrical industry and a list of patents and trademarks that have been granted.

Systematic electrification, including centralization and the construction of 100-kv. lines, and railway electrification are each covered in three articles. Others deal with telephony, telegraphy and radio. The volume concludes with statistics of electrically served communities.

A B C of Television

By Raymond Francis Yates. New York; Norman W. Henley Publishing Company. 210 pages, 100 illustrations.

Written for the radio amateur, this book describes in simple language the construction and operation of radio picture transmitting and receiving apparatus: Photo-electric cells, scanning disks, neon tubes, Kerr cells, and other elements. Timely, apparently prepared under the pressure of having to catch the tide of a favorable market, and therefore having the characteristics to be expected under those conditions, it will interest both the experimenter who wants to make his own equipment and the general reader who merely wants to get an idea of the workings of this new art.

Book Note

MUNDY'S EARNING POWER OF RAILROADS. Compiled and edited by Floyd W. Mundy and published by James H. Oliphant & Company, New York and Chicago, 1929 edition.

This is the complete analysis of the financial position of the railroads of the United States during the past year with a discussion of legislation and any other factors which may have affected the current position of the roads.

Books Received

Advanced Laboratory Practice in Electricity and Magnetism. By Earle Melvin Terry, Ph.D. New York: McGraw-Hill Book Company, Inc., 370 Seventh Avenue. 318 pages, illustrated. Price, $3.

Effect of Service on Endurance Properties of Rail Steels. By John R. Freeman, Jr., and Haig N. Solakian. Washington, D.C.: Department of Commerce, Bureau of Standards. 246 pages, illustrated. Price, 20 cents.

Rare Metals. By Fansteel Products Company, Inc., North Chicago, Ill. 54 pages, illustrated.

Einfuhrung in Die Komplexe Behandlung von Wechselstromaufgaben. By Dr.-Ing. Ludwig Casper. Berlin: Julius Springer, Linkstrasse 23-24. 121 pages, illustrated. Price, 6.60 reichsmarks.

The Art of Rapid Reading. By Walter B. Pitkin. New York City: McGraw-Hill Book Company, 370 Seventh Avenue. 233 pages, illustrated. Price, $2.50.

News of the Industry

Boston Rates to Be Investigated by Commission

Following the refusal of the Massachusetts Department of Public Utilities to permit the Edison Electric Illuminating Company of Boston to split its shares, Governor Allen conferred with Chairman Attwill of the Department of Public Utilities and announced that Mr. Attwill had assured him a full investigation of the rates of that company would be made at once, the Governor promising that whatever additional funds may be necessary will be provided. It is assumed that the Governor has in mind the proceedings that resulted in the department's ordering rate reductions for the Worcester and Cambridge companies which were ultimately accepted.

The Boston City Council on Monday passed an order recommending to the Mayor that he initiate legislation for public ownership of the company's plant. The order was introduced by Councilman Michael J. Ward, who said he would file a bill in the State Senate, of which he is a member, calling for an investigation of the state commission.

On Wednesday the closing sale of Edison stock was at $290. This means a shrinkage in market value of $46,229,375 since last Friday afternoon. On Tuesday the company filed with the commission, in accordance with previous plans, a revised schedule of rates applying particularly to commercial customers and estimated to reduce the revenue from these by more than $600,000 per year. There is a strong probability that the company may take the decision to the courts.

Milwaukee Company to Build 60,000-Kw. Steam Plant

Further additions to the power facilities of the Wisconsin-Michigan group of subsidiaries of the North American Company will result from a new steam-electric generating plant to be built by the Milwaukee Electric Railway & Light Company at Port Washington, Wis. The project involves an initial investment of about $8,000,000 and ultimate expenditure of more than $25,000,000. The initial rating will be 60,000 kw. or more, and ultimately there may be a capacity of 300,000 kw. The proposed site is on the shore of Lake Michigan, 28 miles north of Milwaukee, with convenient harbor facilities.

Construction activities will begin next spring, if the necessary co-operation from the city of Port Washington is forthcoming. The company desires to purchase the Port Washington municipal distribution system. The plant will be similar in operating characteristics to the Lakeside plant.

Trade Commission Says Data Are Withheld

So Complains in Interim Report to Senate—Senator Walsh Ready to Father Legislation if Necessary to Help Utility Investigation

SEVERAL large utility companies are delaying the utility inquiry conducted by the Federal Trade Commission by withholding "pertinent" records relating to information sought by that body. This complaint is contained in the interim progress report just made by the commission to the Senate. Commenting on it in the Upper Chamber, Senator Walsh of Montana said on Wednesday evening that the whole matter might be brought again to the attention of the Senate with a view to obtaining, if possible, further legislation under which the commission could effectively carry out its investigations.

The refusal of other utility companies to supply the commission with all the information it desired, Senator Walsh said, indicated that they were following the lead of the Electric Bond & Share Company, whose officials refused to produce certain records and answer certain questions asked by the commission's examiners, the points raised by that company now awaiting final judicial determination. Senator Walsh appeared satisfied that the commission was doing its utmost to get the full information which the Senate requested in its resolution.

The commission also told the Senate that the investigation was being delayed by lack of sufficient personnel and asked that its appropriation be enlarged. Its statement on the alleged delay follows:

The amount of time spent on field work has been greatly increased in proportion to the progress made owing to the delay of some of the large holding company groups in returning the commission's comprehensive "report of utility corporations," and also the failure of certain holding companies to submit such reports in many important instances, although actually prepared by their subsidiaries. Even more serious has been the withholding from the commission's examiners by some companies of pertinent records relating to important mergers and other financial transactions. The numerous complicated mergers and consolidations effected through the use of intermediaries and syndicates, together with the lack of uniformity and the complexity of holding-company accounting methods, and the employment of numerous subsidiary companies, have made the work of tracing the growth of capital assets laborious at best, even for experienced public utility accountants.

Investment Bankers Condemn Utility Stock Speculation

At the Quebec convention of the Investment Bankers' Association of America this week the committee on public service securities opposed the Couzens bill for the federal regulation of interstate communication and transmission of power as involving unwarranted interference with state regulatory bodies, deplored public misunderstanding about water power, and condemned speculation in the securities of utility companies in these words:

Your committee believes that this association can do no greater service in the present juncture than to caution against speculative and uninformed buying and to counsel the prudent buying of utility securities.

The spectacular rise of the investment trust in this country will receive due consideration from another committee, but mention of the influence of the investment trust on utility securities is too important for this committee to ignore. With almost $2,000,000,000 poured into the capital of investment trusts this year alone, and with probably over $3,500,000,000 now at their disposal, their influence on the market has become very important. Investment has been chiefly in stocks, in the ratio, perhaps, of twelve or more to one against bonds, and the stocks of the big holding companies and groupings have been particularly attractive. This buying has acted as a bellwether to the crowd. The problem is as to what the effect of this new market influence on utility as well as other securities will be should a real stock market liquidation set in.

License for New Holtwood Plant Applied For

Application for a license for construction of a power dam, with six generating units, on the Susquehanna River has been filed with the Federal Power Commission by the Safe Harbor Water Power Corporation of Holtwood, Pa., organized to serve the Pennsylvania Water & Power Company and its Baltimore ally. The application covers building a concrete gravity-type dam about 10 miles above Holtwood, in York and Lancaster Counties. The reservoir would extend 10 miles upstream and the power house would be an integral part of the dam, which would be 3,635 ft. long and would raise the pond to an initial elevation of 225 ft. above sea level, affording a head of 52.5 ft.

The six generating units would have a total capacity of 231,000 hp. and the completed project would, it is estimated, cost $30,000,000. It will, if constructed, be the third major hydro-electric project on the Susquehanna. The site is 8 miles upstream from the present Holtwood hydro plant, rated at 158,000 hp.

Will Not Bear Brunt of Political Attack

President Leonard of Puget Sound Power & Light Company Declines to Fight Any Renewed Effort to Pass Bone District Power Bill in Washington State

NEXT year the proposed act of legislation known as the Bone bill, which aims at public ownership of light and power properties throughout the State of Washington by means of public utility districts set up to acquire and operate them, will again be submitted to the voters as an initiative measure. It was decisively beaten in 1924. In that year the light and power companies played an active part in the campaign waged against it, and there was an expectation that they would again aid the fight with money, speakers and literature.

So far as the Puget Sound Light & Power Company of Seattle is concerned, such expectations, whether cherished by friends of the bill who wished to capitalize any public prejudice aroused against utility companies, or by opponents who would welcome utility aid and direction, will be disappointed if the views of A. W. Leonard, the company's president, prevail. Mr. Leonard says that the power companies do not purpose being held up again as an object of political hate. In the vernacular, they are not willing to be the "goat" of the impending campaign. In explanation of this attitude he authorized Seattle papers to publish the following statement:

The power industry in this state is tired of bearing the brunt of continued political assault. It is tired of serving as a bumper to protect all other industries and businesses and the taxpayers generally from the attacks of those who are advocating public ownership of everything, regardless of costs and consequences.

Our company joined with others of this state in signing an argument against Initiative No. 1, the so-called "power bill." because the law required any argument that might be made to be in the hands of the Secretary of State not later than September 14. We felt that this means of bringing a few facts to the attention of the voters should not be overlooked, but we have no plans for any such organized resistance as was made to previous measures which, like this initiative. were designed to put our industry out of business. We do not intend to let the politicians pose the industry as an object of public hostility.

The avowed purpose of Initiative No. 1 is to take over all existing light and power properties in this state through the creation of an unlimited number of public utility districts. The only change of its adoption lies in the possibility that the voters may neglect to read and study its provisions. It repudiates the theory that any publicly owned utility can be self-supporting by expressly providing for a tax levy every year to cover losses in operation as well as an unlimited annual tax levy on all property for bond interest and redemption.

These tax features alone should defeat the bill, but that is something for the taxpayers to think about. So far as the industry is concerned it does not stand to lose much except the privilege of paying heavy taxes on a vast amount of property, maintaining great payrolls, spending huge sums for labor and materials and otherwise contributing to the prosperity of the state. If the properties of our own company should be taken, for example, we shall receive full compensation for them, whether purchased or condemned. As to this we can suffer no loss. Several hundred millions of dollars have been invested in this state by the light and power companies. Their expenditures for extensions and betterments alone average around $20,000,000 a year. This is equivalent to the establishment of twenty new industries every year with an investment of $1,000,000 each—the kind of business that every community is reaching out for. All this investment goes upon the tax rolls and helps carry the tax burden.

If the people want to wipe all this out, they must reckon on paying the bill, which will run something like this: First, the cost of acquiring the vast amount of private property; second. the cost in taxes sacrificed through taking all this property off the rolls; third, the cost of new taxes to which they must submit in every utility district they create; fourth, the cost of setting up and maintaining an unlimited number of political organizations to do the work, free from any restraint or regulation in state or federal law.

From this it will be seen that Initiative No. 1 calls for more thought on the part of the people than on the part of the private companies now in this field.

In this connection Norwood W. Brockett. director of Public Relations for the Puget Sound company, said: "The statement does not mean that the companies will not prepare an analysis of the bill for distribution to their employees and at their offices and possibly to be inclosed with bills to customers. The statement does mean, however, that the companies refuse to be forced into spending large amounts of money 'every so often' by a few radical municipal ownership people and politicians."

Kansas Section of N.E.L.A. Meets at Hutchinson

Two hundred and fifty delegates were expected to attend the sessions of the thirty-second annual convention of the Kansas Section, N.E.L.A., on October 17 and 18 at Hutchinson. On Thursday morning President Frank M. Stone was to discuss "Public Utilities and Kansas Prosperity," giving figures showing the extent and resources of industry in that state. Roy Bailey, Kansas Chamber of Commerce, was to speak on "What's Being Done to Develop Kansas" and Stanley Skinner, Southwestern Bell Telephone Company, Kansas City, Mo., on "The Relative Progress and Relationship Between Communication and Power Transmission." Round-table sessions were to occupy Thursday afternoon, and on Friday G. W. Lapp, president Lapp Insulator Company, was scheduled to discuss "Airport Illumination" and Tom McNeal, editor *Kansas Farmer*, Topeka, "Fifty Years of Progress in Electricity." A dinner and carnival were to bring the convention to a close Friday night.

Boulder Dam Power Rate, 1.63 Mills per Kw.-Hr.

This Price Suggested by Commissioner of Reclamation Mead—Secretary of Interior Has Three Plans for Disposition of Energy

TO GIVE the conference "something to shoot at," to use the exact words of the Secretary of the Interior, those who assembled in Washington on October 14 to discuss plans for the disposition of the power to be developed at Boulder Dam were asked to consider three alternative plans. These plans, as drafted by Dr. Elwood Mead, the Commissioner of Reclamation, are:

1. That contract be executed with the Metropolitan Water District and the city of Los Angeles for the entire power available, with provision in the contract for release of 35 per cent of the power for the use of the states and other applicants, like the Southern California Edison Company, to which it may be later allocated by the Secretary, such allocation to be made with due regard to preference rights and the public interest, as the act requires.

2. That a contract be executed with the Metropolitan Water District and the city of Los Angeles for 65 per cent of the power available for use by that district, the city of Los Angeles and other municipalities in southern California, with provision for later allocation of the remaining 35 per cent to the states and other applicants.

3. That a contract be executed with the Metropolitan Water District, the city of Los Angeles and the Southern California Edison Company for the entire power available, the Metropolitan Water District to be entitled to such amount of power as may be necessary to pump water for domestic purposes, with provision in the contract for release of the remaining available power for the use of the states and other applicants to which it may be allocated by the Secretary.

This partial allocation, in the opinion of Dr. Mead, would take care of the preference rights of the Metropolitan Water District and other municipalities of southern California and would insure sufficient revenue to meet the minimum requirements of the act. Congress then could make the necessary appropriations so that construction work could begin without further delay.

As an initial rate, Dr. Mead suggests 1 63 mills per kilowatt-hour, and he had drawn up 23 other conditions which he thinks should govern the sale of this power. His plan contemplates that the lessees shall install the power machinery and operate the plant.

The public utilities are contending that as between public and private agencies the same ratio should be preserved that exists at present in the distribution of power—81 per cent private and 19 per cent public. Against this proposal Dr. Mead suggests allocation on a ratio of 60 per cent to private agencies and 40 per cent to public agencies.

Jubilee Will Culminate Next Week

Arrangements Made for Broadcasting Dearborn Program Over America and Across Atlantic—Chicago and St. Louis Make Elaborate Preparations—"Moonlighting" at Cleveland

WHEN President Hoover, Thomas A. Edison, Owen D. Young and Henry Ford speak next Monday night during the celebration of "Light's Golden Jubilee" at Dearborn, Mich., the program will be broadcast over the whole continent and across the ocean from the banquet hall of the new Edison Institute of Technology, where about 500 guests are to assemble to honor Mr. Edison on the fiftieth anniversary of his perfection of the electric lamp. The latest plan is for Mr. Young to be master of ceremonies. Mr. Edison in characteristically few words will thank the world for the homage paid him. Graham McNamee, the radio announcer, will tell the story of the making of the electric lamp.

Grant Park will be the scene of the central feature of Chicago's celebration of "Light's Golden Jubilee," with elaborate electrical displays each night of the week, beginning next Monday. On a steel framework 500 ft. long and 70 ft. high there will be outlined in incandescent lights the first electric bulb, with Edison's profile in the center. Surrounding this will be "Light's Golden Jubilee" outlined in flame effects by electric lights and steam. On Tuesday evening the Electric Association will hold its fourth annual dinner at the Palmer House. Many of the notables who will attend the Edison dinner given by Henry Ford in Detroit on the previous evening are expected to come to Chicago for this event. A special invitation has been sent to Mr. Edison.

St. Louis will stage the most elaborate light carnival ever seen in that city. Twelfth Boulevard from Washington to Market will be a blaze of multicolored light every night next week, an American flag of great size standing out in a flood of light on the northern boundary of the court thus formed and a geyser of steam forming a target for the rays from batteries of light. Powerful searchlights will outline floating dirigibles.

Orville Wright is honorary chairman of the celebration at Dayton, Ohio, which was in full blast this week and will terminate on Monday with a "pageant of progress." The Engineers' Club of the city had a dinner and an open meeting to mark the anniversary.

The Cleveland Electric Illuminating Company has made Cleveland a gift in connection with the celebration in the form of a permanent "moonlighting" system for the Museum of Arts and the Fine Arts Garden. The illuminating company bears the entire expense of its design, installation and upkeep. The "moonlighting" will be inaugurated on the evening of October 21. The bronze lighting units were designed by J. Woodley Gosling of the General Electric Company. Each unit stands 36 ft. high and has at its base a tablet which reads: "In commemoration of the invention of the incandescent lamp by Thomas Alva Edison, October 21, 1879." The lanterns contain white lamps of high power, and the moonlight effect is achieved by specially designed reflectors.

At Menlo Park, N. J., the Public Service Electric & Gas Company will erect on the site of the original Edison laboratory a steel tower 100 ft. high on top of which will be a 15-ft. lamp with a contour similar to that of the original incandescent lamp. The lamp will contain a cluster of 750 10-watt bulbs. The tower will also contain a lamp which will burn perpetually. Later it is intended to substitute a permanent tower, toward the cost of which the public will be invited to contribute. The tower will first be lighted on Monday, when Mr. Edison will press a button during the ceremonies at Dearborn.

Buffalo had its special celebration on Thursday, the program including night flying and a four-mile parade in which bands and drum corps from all parts of western New York, southern Ontario and northern Pennsylvania took part. Leading buildings were specially illuminated, as were the McKinley monument and Gates Circle Fountain.

Illumination of Cleveland's Art Museum

Edison Honored at Orange

For the first time since his recent illness Thomas A. Edison appeared in public on Wednesday evening, when he was the guest of honor at a dinner given at Orange, N. J., in connection with the observance of "Light's Golden Jubilee." Various electric lighting stunts started the proceedings off as the inventor and his wife arrived and were greeted by a "Chautauqua salute." Representatives Franklin W. Fort and Charles A. Eaton paid tribute to the inventor, and William H. Meadowcroft, his secretary and associated with him for 48 years, gave reminiscences of pioneer days in the industry.

Earlier in the day Mr. Edison visited his laboratory. He was to leave for Dearborn in Henry Ford's private car on Friday afternoon.

Purchases and Mergers

CONDITIONAL authority has been granted by the Public Service Commission of New York to the Berlin Electric Light, Heat & Power Company to transfer its system to the Eastern New York Electric & Gas Company.

The Missouri Power & Light Company has offered the municipal authorities of Macon, Mo., $175,000 cash for the municipal light plant and distribution system, also free lighting and free pumping of city water for a period of ten years.

Acquisition of the Glen Brook Power Company of Hart County, Ky., together with the hydro-electric power plant owned by the Lane Lumber & Milling Company at Rio, by the Oscar C. Wright Company of Louisville is announced. The amount involved is reported as approximately $100,000. The Wright concern is the holding organization of a group of five subsidiary companies. Its Kentucky operating subsidiary is the Kentucky Electric Development Company.

Subject to ratification by the voters, the Nantahala Power & Light Company has signed a contract for the purchase of the Andrews (N. C.) power plant and distribution system on the Hiawassee River, municipally owned. The agreed price is $425,000, $53,000 to be paid in cash and the purchaser to assume the town's bonded debt.

Trade Practice Conference at Washington Successful

Rules to Govern Eight Sections of N.E.M.A. Now Await Approval by Full Federal Commission After Tentative Adoption—A Typical Set

EIGHT sections of the National Electrical Manufacturers' Association, as told briefly in the October 12 issue of the ELECTRICAL WORLD, held a conference on trade practices with the Federal Trade Commission last week in Washington. At this conference, presided over by Commissioner McCullough, each section proposed, discussed and passed for approval by the commission a set of rules covering trade practices. As explained by the commissioner, these rules come under two classes:

1. Those covered by law and court decisions based on the Sherman and Clayton acts.

2. Those that appear reasonable by interpretations of law and good business practice, but which have merely contractual legal standing as an agreement between an industry group and the Federal Trade Commission.

The action taken at the conference must await the decision of the full Federal Trade Commission, and some of the rules agreed upon may be modified, disallowed or omitted by that body.

The sections conferring with the commission were those concerned with molded products, manufactured electrical mica, outlet boxes and conduit fittings, flexible cord, panelboards and distribution boards, carbon brushes, vulcanized fiber and carbon arcs. Each group presented its proposed rules after the commissioner had explained the general procedure, and each rule was discussed and voted upon individually.

The conference marked the first attempt of any N.E.M.A. section to act with the Federal Trade Commission, and electrical manufacturers in general as well as other sections of the N.E.M.A. are watching with great interest for the results. No decision is expected from the Federal Trade Commission for some time. A typical group of rules for the molded insulation section that were approved at the conference, but must await the decision of the commission, are as follows:

1. Inducing Breach of Contract.—Inducing or attempting to induce a breach of contract between a competitor and his customer during the term of such contract is an unfair method of competition. Whenever notice of the existence of a contract is brought to the attention of any person in any way he should promptly discontinue all efforts which might induce the contracting party to break such contract.

2. Misbranding.—The false marking or branding of products of the industry, with the effect of misleading or deceiving purchasers with respect to the quality, quantity, grade or substance of the goods purchased, is an unfair trade practice.

3. Fraud and Misrepresentation.—The sale or offering for sale of any product of the industry with misrepresentations calculated to deceive customers or prospective customers as to the quantity, quality, substance or size of such product is an unfair trade practice.

4. Secret Rebates.—The secret payment or allowance of rebates, refunds, credits or unearned discounts, whether in the form of money or otherwise, or the giving of premiums, or extending to certain purchasers special service or privileges not extended to all purchasers under like terms and conditions, is an unfair trade practice.

5. Costs: Selling Goods Below Own Cost.—The selling of goods below own cost for the purpose of injuring a competitor and/or with the effect of lessening competition is an unfair trade practice.

6. Adherence to Published Prices.—The members of the molded industry, while maintaining absolute freedom in the issuance of price schedules from time to time, in conformity with the established trade practices, do adopt as a cardinal principle that there shall be no discrimination as between purchasers of like amount and conditions in the same territory, and that where published prices are issued by any member same shall set forth plainly the price and terms and conditions, and that such published prices shall truly represent the sales price in all cases where the goods sold and the quantities and conditions and terms are set forth in the consignor's current price schedule, and any deviation from the principle expressed herein shall be deemed an unfair trade practice.

7. Competitor: Enticement of Employees.—Interference with a competitor's business through the enticement of employees from his employment is an unfair trade practice.

8. Competitor: Defamation of or Disparagement of His Goods.—The defamation of a competitor by words or acts imputing to him dishonorable conduct, inability to perform contracts, or questionable credit standing, or the false disparagement of the grade or quality of his goods, is an unfair trade practice.

9. Uniform Contracts.—In order to conform to the principles of these rules a uniform sales contract and proposal form should be used in all transactions.

10. Publicity of Current Prices.—In order to protect the public from price discrimination and to inform it of current market prices of molded products, the industry hereby records its approval of the widest possible publicity of all current price lists and of all notices of advance or decline in prices made by any manufacturer.

11. Piracy of Styles.—The members of the molded industry go on record as being unalterably opposed to any piracy of designs or styles; they condemn such action, and they will make every effort within their power to bring about the discontinuance of such practices.

12. Cost: Definition of.—The term "cost" shall be interpreted to include among other items the cost of raw materials, transportation, manufacturing, depreciation, depletion, obsolescence, interest charges, selling and administrative expenses. It is the judgment of this conference that all manufacturers of molded products should adopt a uniform cost system.

13. Arbitration.—The industry hereby records its approval of the practice of handling disputes between manufacturers of molded products in a fair and reasonable manner, coupled with a spirit of moderation and good will, and every effort should be made by the disputants themselves to arrive at an agreement. If unable to do so, they should refer the matter to the conciliation committee of the National Electrical Manufacturers' Association, as arbitration is at all times preferable to litigation with its costly handicaps and delays.

14. Violation of Rules.—This conference authorizes the president of the National Electrical Manufacturers' Association to appoint a committee of the molded industry to make preliminary investigations of all alleged violations of these rules, to attempt to adjust within the industry any such alleged violations and to report to the commission such violations as cannot be satisfactorily adjusted.

Prendergast Asks Control of Holding Companies

Chairman of New York Commission Tells Legislative Inquiry that His Colleagues Are in Accord on This Point—His Attitude Criticised

EXTENSION of the jurisdiction of the New York Public Service Commission to holding companies was recommended on Wednesday of this week by William A. Prendergast, the commission's chairman, in testifying before the special legislative commission appointed to inquire into the state's system of public utility regulation. Mr. Prendergast, in reply to questions, said he believed his fellow-commissioners were in accord with him on this point. The engineers and experts of the commission had been consulted, he said.

Mr. Prendergast also recommended that the commission should have jurisdiction over all the state's telephone corporations. He renewed his recommendation for amendments covering submetering of electricity, which failed to pass in the last legislative session.

Hearings were resumed on Thursday and Friday of last week, following the opening sessions reported in the ELECTRICAL WORLD of October 12. On Thursday Prof. James C. Bonbright, a member of the legislative commission, endeavored to introduce a resolution ordering the filing of statements regarding all connections on the part of members of the investigating body, whether direct or indirect, past or present, with any public utility subject to the public service law. Action on this resolution was deferred on October 16 to permit its possible amendment.

On Friday a brush between Commissioner Prendergast and Professor Bonbright occurred when the latter accused the former of being constantly on the defensive and delaying the progress of the hearing by this attitude. It was Commissioner Prendergast's contention that the commission needed no defense but that where questions affecting the standing of the commission arose he should speak on its behalf. The commissioner testified that of 8,559 orders issued by his organization only 46 had ever been taken to court and only ten had been reversed.

The question of refinancing short-term debts and the possibility of improper supervision of authorized stock or bond issues in such cases was introduced by Professor Bonbright. It was Mr. Prendergast's reply that before authorization of security issues all underlying facts were investigated.

New Rates Ordered for Baltimore Company

New rates ordered last week by the Maryland Public Service Commission for the Consolidated Gas, Electric Light & Power Company of Baltimore will, it is estimated, bring to its customers an annual saving in electric and gas rates on the basis of present consumption of $1,300,000, of which $960,000 is in the electric schedules. The new tariff prescribes a primary monthly domestic rate of 7 cents a kilowatt-hour for any quantity under 25 kw.-hr., a secondary rate of 3½ cents up to 225 kw.-hr. and a tertiary rate of 2½ cents for all in excess. The minimum charge will be 75 cents. There is no change from the former schedule in the primary charge, but formerly 4 cents was the price between 25 kw.-hr. and 800 kw.-hr., so that the second step imposes a large decrease.

The order of the commission, which followed prolonged hearings, will become effective November 1. Herbert A. Wagner, president of the Baltimore company, has pledged acceptance. Members of the Industrial Power Consumers' Association complained that the ruling of the commission granted them only $70,000 saving and left them bearing a burden greater than in any comparable city, but it is thought that no further changes in the rates will be made at this time.

Arkansas Company's New Rates Find Favor

Unlike his predecessor, who last year vetoed a similar proposal, the Mayor of Little Rock is quoted as favoring the proposed new rates of the Arkansas Power & Light Company, printed in the ELECTRICAL WORLD for October 5 (page 704). These rates, if accepted, will be standard throughout the company's territory. An election scheduled for this week at Russellville, Ark., to vote on issuing bonds for a newer plant was called off by the City Council there after the company had explained its proposed schedule, the authorities being satisfied that they could not cut under them by establishing a municipal system.

Northern States Power Makes Still Another Cut

Voluntary reductions totaling $377,700 annually to commercial lighting and retail power customers were announced on Monday of this week by the Northern States Power Company for Minneapolis and St. Paul. Adding this to the reductions previously announced in the last twelve months, the company has made cuts totaling $1,250,000 annually in the Twin Cities and $2,500,000 in the Central Northwest.

Under the present schedule the general power rate is 6.5 cents a kilowatt-hour for the first 52 hours' use of the maximum quantity of current on a monthly basis and 2.7 cents for consumption in excess. The new rate, to take effect in December bills, will be 6 cents a kilowatt-hour for the first 50 hours' use of maximum demand, 2.5 cents for the next 150 hours and 1.8 cents for consumption after the first 200 hours. The new commercial lighting rate will be 9 cents for the first 50 kw.-hr., 7.5 cents for the next 100 kw.-hr. and then 4 cents. Former rates were 9 cents for 100 kw.-hr., 7.5 cents for the next 100 kw.-hr. and 5 cents for all in excess.

Changes in Rochester Gas & Electric Tariff

The New York Public Service Commission has approved amendments to the domestic electric schedules of the Rochester Gas & Electric Corporation as follows, applying to the city of Rochester and neighboring villages and towns: When the meter size required to serve a customer is less than 25 amp. the demand charge will be $1.25 per month; with a 25-amp. meter the charge shall not exceed $2, and with a meter larger than 25 amp. it shall not exceed $3. Energy charge is to be 4 cents per kilowatt-hour. At present the demand charge of $1.25 per month is limited to 16-amp. motor capacity, above which the demand charge is $1 per month per kilowatt of rated demand.

Kansas City Power & Light's Voluntary Reduction

The Missouri Public Service Commission on October 12 approved a new schedule of rates for the Kansas City Power & Light Company affecting Kansas City and 37 other cities and towns served by the company and which will reduce the cost of electricity to the customers about $360,000 a year. The rates, which will go into effect November 1, were noted in the ELECTRICAL WORLD for August 31 (page 438). The reduction was voluntary on the part of the company.

Drought Affects Maryland and Massachusetts Hydro Plants

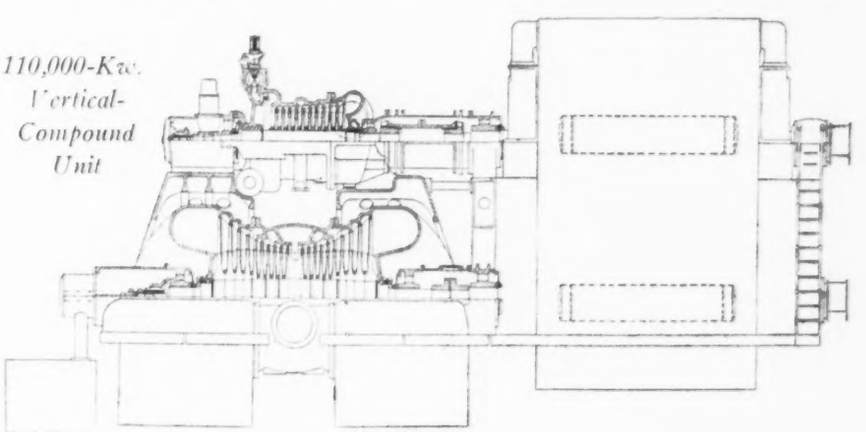
The country-wide nature of this summer's drought is clearly indicated by Geological Survey reports, which show that for the first time since 1921 water-power production in the United States during 1929 will undoubtedly be smaller than it was during the previous year in spite of a large increase in demand for electricity which has taxed many of the steam plants to capacity. During the first eight months of 1929 the output of water-power plants had increased by only 2 per cent over the first eight months of 1928, while the production of energy by fuel-using plants had grown by 18½ per cent.

Some figures given by the Geological Survey show Massachusetts and Maryland to have been among the states whose water-power was hard hit. During August, for example, the water-power plants in Maryland operated at less than 12 per cent of capacity, the total production being 26,800,000 kw.-hr., as compared with 104,000,000 kw.-hr. during August, 1928, and with a high point of 179,000,000 kw.-hr. in May, 1929. In Massachusetts only 26,000,000 kw.-hr. was produced by water-power in August, as compared with 52,450,000 kw.-hr. last year.

Ford to Install Vertical-Compound Turbo-Generator

A 110,000-kw. vertical-compound turbo-generator is soon to be installed by the Ford Motor Company in the power generating station of its River Rouge plant at Fordson, Mich. This machine, which involves unusual features of design, will far exceed in rating any existing prime mover used for industrial purposes, according to the manufacturer, the General Electric Company.

The high-pressure turbine and generator will be mounted directly on top of the low-pressure turbine and generator, resulting in the most compact unit yet proposed. Each element has a capacity of 55,000 kw. The general dimensions are: Length, 57 ft. 6 in.; maximum width, 23 ft.; over-all height,



110,000-Kw. Vertical-Compound Unit

just under 21 ft. The space to be occupied is less than a quarter of a cubic foot per kilowatt of output and is approximately the same as was occupied by two older units which together produced only 25,000 kw.

The new machine will be installed in 1930. Its complete technical rating is 110,000 kw., 90 per cent power factor, 13,800 volts, 1,800 r.p.m., three-phase, 60 cycles, with steam conditions of 1,200 lb. gage pressure, 725 deg. F. total temperature, reheating to 550 deg. F. and 1-in. vacuum. In the reheaters steam at 1,200 lb. pressure direct from the boilers will reheat the steam exhausted from the high-pressure turbine, which will then flow down and into the low-pressure unit. To supply cooling water for the new unit a tunnel will be constructed connecting the River Rouge with the Detroit River. This tunnel will be 3½ miles long, 15 ft. in diameter, and will deliver 600,000,000 gal. of water every 24 hours.

The General Electric Company has under construction for the Pacific Gas & Electric Compound a turbo-generator in which also the high-pressure element is mounted on top of the low-pressure element. It was described and illustrated in the ELECTRICAL WORLD for May 25 (page 1066).

To Hold Insulation Conference Next Month at M.I.T.

The committee on electrical insulation, Division of Engineering and Industrial Research, National Research Council, will hold an annual meeting and three-day conference under the chairmanship of Dr. J. B. Whitehead at the Massachusetts Institute of Technology on November 14, 15 and 16. Thursday, the first day, will be devoted to meetings of sub-committees. On Friday the conference will be welcomed by President Stratton of the institute, and Dr. Whitehead will address it. Technical sessions in the morning and afternoon will be participated in by well-known engineers. There will also be a discussion of the research work under way in the laboratories of the M.I.T. Saturday morning will be devoted to a technical session at which progress reports of research work under way in laboratories of the Universities of Illinois, Harvard, Johns Hopkins and the Massachusetts Institute will be made.

Among those who will present papers are W. F. Davidson, Brooklyn Edison Company; C. F. Hirshfeld, Detroit Edison Company; D. W. Roper, Commonwealth Edison Company; R. W. Atkinson, General Cable Corporation; Profs. E. B. Paine of the University of Illinois, C. L. Dawes of Harvard University, J. B. Whitehead of Johns Hopkins, P. H. Moon of the Massachusetts Institute of Technology, and others. The conferees will be guests of the M.I.T. at luncheon each day. Other social features are being arranged for the entertainment of the engineers who are expected to attend.

Work Begins on Oneida-Rome (N.Y.) Transmission Line

Construction work was started on October 1 on a high-tension transmission line extending from Oneida to Rome, N. Y., which is being built as a joint project by the Northern New York Utilities, Inc., and the New York Power & Light Corporation, both operating units in the Niagara-Hudson Power Corporation system. This line will give Rome an additional source of power supply at 110 kv. from the Mohawk-Hudson transmission system and will supplement the 110-kv. lines which now supply Rome from the Northern New York system.

The Oneida substation, where the new line will receive its power supply, is on one of the important transmission centers on the Mohawk-Hudson system extending from Syracuse to Albany. High-voltage lines enter here from the west, south and east, bringing power from the stations in the western part of the state, from Binghamton, Trenton Falls and the steam station at Utica, from the steam station at Amsterdam, and the New York Power & Light Corporation's hydro-electric plants on the Mohawk and Hudson Rivers.

The new line will be 13 miles in length, of steel-tower construction, with approximately 800-ft. spacings and erected on a right-of-way 100 ft. in width. The work, which is being done by Stevens & Wood of New York City, is expected to be completed before the first of the year.

West Virginia Commission Drafts New Rules

New rules and regulations, drawn up in accordance with the water-power act passed at the last session of the West Virginia Legislature, have been promulgated by the Public Service Commission of that state. Applicants for permission to generate hydro power must satisfy many requirements and must furnish a statement of the effect of the proposed operation of the project works on the normal flow of the stream, including a statement of the minimum flow proposed to be released during periods of low water and a full exposition of the relation of any proposed ponding of the flow to the conservation and utilization in the public interest of the available water resources for the purposes of power, navigation, flood control and municipal water supply.

There must also be an exhibit of all present and proposed sources of power for the system of which the project or projects will be a part, including approximate location, whether water power or steam power, ultimate capacity of all power plants in use or proposed to be used and the present installed capacity of constructed plants. On applications complying with all conditions a hearing will be held not less than four weeks after the filing of the petition.

Underwriters and A.S.A.

First Step Toward Nation-Wide Recognition of the Electrical Specifications of the Underwriters' Laboratories Is Taken by Standards Association

THE American Standards Association has announced its approval as an American standard of the Underwriters' Laboratories' standard for outlet boxes. This marks the completing of the first step in a comprehensive program for securing a nation-wide, formally recognized status of Underwriters' Laboratories' specifications for electrical apparatus, devices and materials.

In 1927 the American Standards Association revised its procedure so that its review of standards could be expedited. Thereupon the Underwriters' Laboratories applied for and was assigned a so-called "proprietary sponsorship" for a project (ASA No.-33) with scope as follows:

Specifications and standards for performance and inspection covering fire and/or casualty hazards of devices and materials employed in installation of electric wiring to which the National Electrical Code and related parts of the National Electrical Safety Code apply, but not for devices or machinery used wholly or chiefly in power generation, in substations, on transmission lines and the like, nor in railway signaling, telegraph and telephone, or other electrical fields, except as the fire and casualty hazard in the premises served is concerned.

The text of the newly approved standard for outlet boxes is a compilation of requirements which for some time have been recorded in the National Electrical Code, in the standards of the National Electrical Manufacturers' Association and in the specifications of the electrical department of the laboratories. The approved text was prepared in co-operation with a committee of the N.E.M.A. and before submittal for approval was circulated for review and comment to all interested manufacturers as well as to a number of member and co-operating bodies of the A.S.A. group.

Standards for a number of other products, devices and materials included in the comprehensive list of the above scope are being prepared for early submittal and like review. It is to be expected that relatively large numbers of such approved standards applying to the laboratories' electrical work will be available within the next twelve months.

Underwriters' Laboratories was the first co-operating body to be listed as a "proprietary sponsor" with the American Standards Association. Coincidentally, the standard for outlet boxes is the first to be approved under the proprietary sponsorship plan. The association's rules define proprietary sponsorship as appropriate where the organization occupies a position of predominant importance in the field and where the necessity for co-ordination of a group of standards is paramount. Such co-ordination is of evident paramount importance in the activity covered by the scope above.

Briefer News

RATE HEARINGS FOR PORTLAND ELECTRIC POWER AGAIN POSTPONED.—Further postponement of the date of the hearing before the Oregon Public Service Commission on the valuation and rates of the Portland Electric Power Company from October 15 to November 12 has been announced by the commission. This postponement was effected largely at the request of the city.

FORT DODGE RATES SETTLED.—An ordinance reducing light and power rates at Fort Dodge, Iowa, more than $30,000 annually—the second such reduction this year—has been approved by the City Council and accepted by the Fort Dodge Gas & Electric Company. The new schedule abolishes the service charge of 50 cents a month and fixes a rate of 8 cents for the first 50 kw.-hr. and 3 cents for all over that.

LOGAN (W. VA.) PLANT TO BE EXPANDED.—Approximately $275,000 is to be expended by the Appalachian Electric Power Company in improving its steam generating plant at Logan, W. Va. A Babcock & Wilcox boiler of 1,964-hp. rating will take the place of two 500-hp. boilers now operating, and pressure will be increased from 215 lb. to 275 lb. Other improvements will be made.

A NEW ELECTRICAL ENGINEERING COURSE AT MOORE SCHOOL, U OF P.—Institution of a new evening course which will lead to the degree of master of science in electrical engineering has been announced by Dr. Harold Pender, dean of the Moore School of Electrical Engineering of the University of Pennsylvania, from whose office information on requirements for registrants can be obtained.

POWER COMMISSIONERS RETURN FROM CUMBERLAND FALLS.—The Secretaries of War, Agriculture and the Interior returned to Washington last Saturday from their visit to the Cumberland Falls power site in Kentucky, in company with other commission officials. Chairman Good said no decision regarding a license would be made until the Attorney-General had passed on points raised affecting the commission's jurisdiction.

FOUR MORE ELECTRIC LOCOMOTIVES FOR GREAT NORTHERN RAILWAY.—The General Electric Company has announced that the Great Northern Railway Company has placed with that company a contract covering four additional electric locomotives, costing about $250,000 each. These locomotives are virtual duplicates of present General Electric locomotives and are intended for operation in the electrified zone of the railroad. They weigh 265 tons each, are 75 ft. long, operate in multiples, each unit being capable of handling a 1,000-ton train on any of the grades, and have six traction motors delivering power to six axles with driving wheels nearly 5 ft. in diameter.

WINNFIELD, LA., REJECTS PROPOSAL FOR MUNICIPAL ELECTRIC PLANT—At a recent election held in Winnfield, La., to decide whether to lease the municipally owned waterworks system to the Gulf Public Service Company, which owns and operates the electric light and power plant, or retain the operation of the waterworks and install a competing electric plant, in accordance with a proposal submitted by Fairbanks, Morse & Company, the citizens, by 340 to 190, rejected the municipal plant proposal and favored the lease.

REBUILDING DAM ADDS 10 PER CENT TO OUTPUT.—To increase the efficiency of hydro-electric generation at the Oakland plant of the Northern Pennsylvania Power Company at Susquehanna, Pa., the company has just rebuilt the dam across the Susquehanna River, thus, it is expected, adding at least 10 per cent to the net output. The dam was built in record time, a unique feature of the undertaking being the employment of a deep-sea diver, who worked at a depth of from 10 ft. to 14 ft. under the river.

PACIFIC COAST CREDIT MEN MEET.—The general financial situation and its effect upon sales of electrical products formed the chief subject of consideration at the only open meeting of the quarterly convention of the Pacific Division, National Electrical Wholesalers' Association, held at Del Monte, Calif., October 3-5. J. F. Silverstein, Commercial Trust Company, San Francisco, spoke on "Consumer Time-Payment Financing," and George F. Kern, Crocker First National Bank, San Francisco, discussed "The Present Money Situation and Its Probable Effect on Future Business."

COMPETITION IN SOUTH GEORGIA.—The Tifton (Ga.) City Commission has passed a resolution granting the W. B. Foshay Company a franchise to run its lines into Tifton and sell electrical energy in competition with the South Georgia Power Company. A condition of competition exists in this territory said to have started when the South Georgia Power Company recently ran its lines to a Swift Packing Company plant outside of Moultrie, in territory which the Foshay company claims. The Foshay company has retaliated by getting franchises in towns already served by the South Georgia Power, and a rate war is considered possible. The W. B. Foshay Company recently acquired the Baker County power plant, and it has contracted with the Crisp County plant, now under construction, for a portion of its power. A report says it may build a steam plant at Moultrie.

HEARINGS ON INDIANA MERGER TO BE OPENED ON DECEMBER 2.—Public hearings on the seventy-million-dollar Insull merger in Indiana, embracing electric power, traction and gas companies, will be opened by the Public Service Commission December 2 in the Senate chamber at the State House in Indianapolis. When all audits, appraisals and exhibits shall have been submitted a recess will be taken to permit study of the evidence. A large number of witnesses will be heard.

POWER GROUP, NEW YORK SECTION, A.I.E.E., BEGINS SECOND YEAR.—With a meeting to be held on October 30 the Power Group of the New York Section of the A.I.E.E. will begin its second season of activity. The group is the outcome of a plan adopted last spring to divide the membership of the New York Section into power, communication, transportation and illumination groups, each handling its own meetings and general affairs and the four groups uniting for monthly meetings as before. The formation of the Power Group has made possible programs of specific interest to the members connected with the power field and more general discussion, particularly by the younger members. Two good meetings were held in the spring. On October 30 the subject of the group will be generation and th development of generators with papers by H. C. Forbes and C. M. Gilt. On December 9 the group will discuss system connections, on March 11 high-tension transmission cable, and on May 13 high-tension overhead transmission. Meetings will be held in Room 1 of the Engineering Societies Building at 7:30 p.m.

EXPANSION OF HOUSTON LIGHTING & POWER.—During the twelve months ended August 31 the Houston Lighting & Power Company, according to recent announcement, installed an additional turbo-generator and made other improvements to its Deepwater plant at a cost of $3,500,000, besides extending its street-lighting systems to La Porte, Wharton, Goose Creek, Pasadena and South Houston. It now serves twelve counties. Recently erected substations are at West Junction, New Gulf, Raccoon Bend, Katy, Tomball and Westfield. New substations in Houston are the North Side and Dunlavy.

SEATTLE BUYS LAND IN CANADA FOR HYDRO-POWER RESERVOIR.—In preparation for flooding an area 45 miles long, reaching into Canada, when the Ruby Creek Dam is built for the Seattle city light department on the Upper Skagit River, the City Council has passed an ordinance authorizing the acquisition of a square mile of land known as the Whitworth Ranch on the Canadian side of the line. It is expected that the Ruby Creek Dam will be begun soon after completion of the Diablo Dam, a few miles down the Skagit from Ruby Creek, which will probably be finished next year.

NIAGARA-HUDSON CORPORATION TO PROMOTE NEW INDUSTRIES THROUGH ADVERTISING CAMPAIGN.—As the result of negotiations between the presidents and secretaries of the chambers of commerce of Niagara Falls, Buffalo, Syracuse, Utica and Albany and Floyd L. Carlisle and R. W. Stevens of the Niagara-Hudson Power Corporation, the latter have agreed that their company will undertake a national advertising campaign to help attract new industries to the territory served by it. Specific plans for this campaign were made at a meeting between the heads of the chambers of these five cities and officials of the corporation, who also indicated what separate local utilities were planning to do in this way.

NEW COMMERCIAL RATES FOR JACKSONVILLE.—New rates for electric power used by business houses in Jacksonville, Fla., have been approved by the City Commission. The rates, to become effective in November, will be 3 cents per kilowatt-hour for the first 2,500 kw.-hr. used within the city limits and 4 cents for industries outside the city limits.

ELECTRIFICATION TOPICS OF AGRICULTURAL ENGINEERS AT AMHERST, MASS.—"What Electric Utilities Can Do for Agriculture," a paper by H. C. Fuller scheduled for presentation at the annual meeting of the North Atlantic Section, American Society of Agricultural Engineers, at Massachusetts Agricultural College, Amherst, October 17 to 19, was to be followed by discussions covering the electric ventilation of dairies, electric brooders, hotbeds and hay hoists, the Roe plow, rural line construction and electric refrigeration. J. R. Haswell was to discuss "Rural Electrification and the Extension Engineer."

FORTY AND A HALF MILLIONS IN ONE YEAR FOR IMPROVING TRANSMISSION AND DISTRIBUTION IN NEW YORK.—Out of a construction budget for 1929 amounting to $80,000,000, more than half —$40,500,000—is, according to a statement just made by President Sloan, being spent in extending and improving the transmission and distribution lines of the five companies composing the Greater New York system. While Manhattan and more congested portions of the other boroughs have had underground transmission and distribution of electricity for years, other sections still have overhead distribution, and these will benefit through the companies' ten-year program for removal of poles and wires. The new network system will form a grid of street mains, bound together block by block. This network will be tied in by means of transformers with generating-station and distributing-station feeders in such a way that if an accident occurred to a street main, or even to a transformer serving a whole block, the service to individual buildings would not be interrupted because current would come from transformers and mains in other blocks.

JACKSON, TENN., TALKS OF BUILDING MUNICIPAL PLANT.—Mayor Lawrence Taylor of Jackson, Tenn., where the citizens on August 1 voted by a great majority in favor of issuing bonds in the amount of $750,000 to build electric and gas plants, has written to the West Tennessee Power & Light Company asking for lower rates and asserting that unless they are granted steps toward building the plants will be taken. Vice-President John Wisdom of the company, saying that the rates asked by the Mayor would prevent a reasonable return on the investment, offers to submit the question to the Tennessee Railroad and Public Utilities Commission for determination.

PRELIMINARY WORK AT CHATS FALLS ON THE OTTAWA RIVER.—Preliminary construction work is under way on the big hydro-electric project at Chats Falls, on the Ottawa River, about 30 miles west of Ottawa. Workmen are clearing land on the Quebec side of the river preparatory to the construction of a cofferdam 30 ft. in height. The Quebec power rights are controlled by the Royal Securities Corporation and Nesbitt, Thomson & Company of Montreal, who have authorized a dam running into the Ottawa River for three-quarters of a mile. Power development on the Ontario side may be undertaken by the Ontario Hydro-Electric Power Commission. Expenditure on the Quebec portion of the dam is expected to be $2,500,000, and if the Ontario government joins in, the continuation of the dam to the Ontario shore would, it is estimated, involve a total of $7,500,000. It is thought likely that 250,000 hp. or more will eventually be developed at this site. The Gatineau Power Company will spend nearly half a million dollars this winter in the erection of a 225-kv. steel-tower transmission line from its power plant at Paugan Falls, on the Gatineau River, to Chats Falls, where it will connect with a line from Toronto now under construction by the Ontario Hydro-Electric Power Commission. The new line, which will carry about 130,000 hp. from Paugan to Toronto, will parallel the existing line.

Coming Meetings

[A complete directory of electrical associations, with their secretaries, is published in the first issue of every volume. For latest list see issue of July 6, page 46.]

Public Utilities Association of West Virginia—Charleston, W. Va., Oct. 23-24. A. Bliss McCrum, P. O. Box 1483, Charleston, W. Va.

Great Lakes Division, N.E.L.A.—Engineering Section, Lorain Hotel, Madison, Wis., Oct. 23-26. L. F. Hickernell, Stevens & Wood, Jackson, Mich.

American Engineering Council—Mayflower Hotel, Washington, Oct. 24-25. L. W. Wallace, 26 Jackson Place, Washington, D. C.

North Central Division, N.E.L.A.—Accounting Section, Nicollet Hotel, Minneapolis, Oct. 28 and 29. J. W. Lapham, 803 Plymouth Bldg., Minneapolis.

National Electrical Credit Association—Middle and Southern Atlantic States Association, Hotel Sylvania, Philadelphia, Nov. 8; Central Division, Nov. 21 and 22 (place to be selected); New York Division, Hotel Pennsylvania, New York City, Dec. 10; New England Division, University Club, Boston, Jan. 21. F. P. Vose, 1008 Marquette Bldg., Chicago.

Public Utilities Association of Virginia—Chamberlin-Vanderbilt Hotel, Old Point, Va., Nov. 21 and 22. A. B. Tunis, 306 Grace Securities Bldg., Richmond, Va.

American Institute of Electrical Engineers—District meeting, Chicago, Dec. 2-4; winter meeting, New York, January 27-31. F. L. Hutchinson, 33 West 39th St., New York.

WEST PENN POWER COMPANY WINS SAFETY TROPHY.—The West Penn Power Company, of which H. F. Webb is safety director, won the 1929 National Safety Council trophy for light and power companies, this award being presented to it at the recent Chicago convention of the council. The Duquesne Light Company of Pittsburgh was second and the Kentucky Utilities Company of Louisville third. The West Penn Power Company made an enviable record. Only fifteen accidents occurred among 2,548 employees during 3,460,000 working hours from January to July.

TERRITORIAL DISPUTE IN SOUTH ALABAMA.—A dispute has arisen between the Alabama Power Company and the River Falls Power Company of Andalusia over territory to be served, and the question has come before the Alabama Public Service Commission in the form of an objection by the River Falls company to a petition by the Alabama Power Company for permission to supply power to the town of Coffee Springs. The River Falls company wants to construct a transmission line from Samson to Coffee Springs and Bellwood. The Alabama Power Company wants to transmit energy from its Enterprise plant.

CENTRALIA, WASH., VOTES TO GO ON WITH MUNICIPAL HYDRO PROJECT.—By 1,600 to 232, voters of Centralia, Wash., have decided to continue construction of the million-dollar hydro-electric project which the city has started. The second election was necessary because a Supreme Court decision had declared the first election invalid on grounds that insufficient legal notice had been given prior to the election. More than one-half the 9-mile diversion canal and two-thirds of the diversion dam and intake works on Nisqually River, where the project is to be developed, have been built. The Council plans to take steps immediately to issue $650,000 in bonds to complete financing of the remaining part of the work. The plant will produce 11,000 hp. when completed. A new suit has, however, been filed in the Lewis County Superior Court to restrain the city from proceeding with the construction of the project and to have the special election declared null and void on the ground that the ordinance under which it was held was illegal.

Massachusetts Commission Forbids Stock Split-up

Declares that No Public Interest Will Be Served by Boston Edison Company's Reducing Par Value of Shares at This Time

MUCH interest in public utility circles has been aroused by a unanimous decision of the Massachusetts Department of Public Utilities, rendered October 11, forbidding the Edison Electric Illuminating Company of Boston to change the par value of its common stock from $100 to $25 a share, a plan approved by the stockholders and which awaited only the department's sanction. Following are the main points made by the commission in this connection:

At the hearing counsel for the petitioner, in response to an inquiry as to why it was desired to make the change, stated that it was because "it is the fashion." . . . No other reason for making the change was advanced. . . . We do not think that we ought to grant our approval to the change in the par value merely because it is the fashion or because other companies have seen fit to make the change. . . .

Due to the action of speculators or other interests, the price of the stock has risen on the Boston Stock Exchange to such a point that no one, in our judgment, viewing it from the standpoint of an investment on the basis of its earnings, would find it to his advantage to buy it. . . . Any advantage which might be derived by making it easier for investors to purchase shares of stock, by reason of their being enabled to buy fractions of the present stock, is largely offset by the enhanced speculative price. . . . The investing public can have no assurance that the business of the company in the near future will be such as to warrant any considerable increase in the dividends on the capital stock of the company or that they will be entitled to such an increase. This company has for years adopted the practice of distributing practically all its earnings in dividends, with the result that it has made little provision for depreciation or surplus.

Its rates do not compare favorably with other companies in the state which in the past have made more adequate provisions for depreciation and surplus requirements. Moreover, we think that this company ought not to increase its dividends until it is able to sell electricity in its territory at rates comparable with some of our municipal plants, having regard for the fact that the municipal plants are not required to pay taxes and the fact that by permitting the privately owned company to furnish the service the public is relieved of the risk of its capital in the enterprise. The net maximum rate of the Edison company at the present time is 8½ cents. In effect it is a rate of 8 cents, as the company furnishes lamps. This compares with 5 cents charged in Worcester and 5½ cents in Cambridge and Springfield. . . . Compared with municipal plants the situation is still more striking. . . .

Nor is there any warrant for the present prices of the stock based on any theory that the reproduction value of the property is such as to entitle the company to a large increase in its earnings and its ability to thereby pay increased dividends. . . .The company, even under the so-called cost of reproduction theory, would not be entitled to earnings much in excess of what the company is obtaining at the present time. . . . Thus, in our judgment, the approval of the company's proposal, at this time, would have little, if any, effect in causing a wider distribution of its stock among investors. Such as would occur would, in our opinion, be to the disadvantage of the investor.

Another consideration leads us to the opinion that at the present time we ought not to approve of the company's action in reducing the par value of its stock. The par value of the company's stock, plus premiums paid in thereon, results in an average investment in the stock of this company of approximately $169 per share. Under the law this department fixes the price at which the stock shall be sold, if, in the judgment of the department, the company proposes to sell it at a price so low as to be inconsistent with the public interest. Heretofore the highest price at which we have authorized the issuance of this stock has been $215 a share. . . . It is usual upon the division of stock that the spread between the speculative price and the intrinsic value is increased, and thus in dealing with the proper price at which such stock should be issued, the spread between the price at which it would be sold on the Boston Stock Exchange and the price at which this department would require it to be sold probably would be increased. This, we think, would be unfortunate, as it increases the speculative value of the rights and encourages people to purchase stock, relying upon the fact that they will augment the deficiency in return on the stock by the price that they can obtain for the rights. This, in our judgment, is not in the public interest.

No public interest will be served by the reduction of the par value of the stock at this time. On the other hand, it is likely to encourage the belief in the minds of many innocent people that it is the forerunner of substantial increases in dividends, with the consequent result of their investing in stock at a very high price, without their hopes being realized. Any attempt to change the par value of this stock, in our opinion, should be left until the selling price on the Boston Stock Exchange more nearly approximates its real value.

Commission Rulings

PREFERRED METHOD OF ESTIMATING DEPRECIATION—COMPLICATED ROOM-RATE SCHEDULES CONDEMNED.—The city of Polson, Mont., filed a complaint with the Montana Public Service Commission against the Public Utilities Consolidated Corporation, alleging that its rates were too high and that its schedules were unscientific and confusing. In comparing two separate evaluations of the company's property the commission found the chief discrepancy to arise from different methods of computing depreciation—one appraiser basing his figures on an actual examination, the other employing the 6 per cent sinking-fund method. The commission gave the greater weight to the former. It also condemned the room-rate schedule as too complicated and substituted block rates. On this point it said in part: "The form of rate has a scientific background. It is a promotional rate that tends to encourage the use of heavy-duty appliances. . . . The utility, however, has attempted to base the applicable rate upon the number of rooms in a dwelling actively in use. For instance, a customer living in a ten-room house but actually using only five was given the five-room rate. This also tended to dissatisfaction as it was apparent that there existed the opportunity for favoritism in permitting the utility to decide into what class a dwelling of a certain number of rooms fell, as well as the opportunity for imposition upon the utility. The commission has always been of the mind that the simplest form of rate—the one that is most easily understood by the consumers—is the proper schedule and the one that will best promote good public relations between the consumers and the utility."

Recent Court Decisions

INVASION OF TERRITORY CANNOT BE JUSTIFIED ON PLEA THAT INVADER WILL SUPPLY ALTERNATING INSTEAD OF DIRECT CURRENT.—The Circuit Court of Curry County, Ore., has rendered a decision which makes permanent a temporary injunction prohibiting the Gold Beach Utilities, Inc., from invading operating territory claimed by the Gold Beach Electric Company. This suit resulted when the Gold Beach Utilities, Inc., sought the right to serve customers in the town of Gold Beach with alternating current, holding that it was entitled to this operating privilege on the ground that the field was not at that time receiving such service. The Gold Beach Electric Company brought suit to enjoin the other operator, promising that alternating current would be provided on request.

EVIDENCE OF CUSTOM OF OTHER COMPANIES COMPETENT ON ISSUE OF DUE CARE IN INSPECTION.—After twice ordering a retrial of Dunagan vs. Appalachian Power Company on appeal by the plaintiff, the United States Circuit Court of Appeals in West Virginia sustained on a third appeal a third verdict for the defendant company. The ground for the appeals was the action of the trial court, which the reviewing body held was wrong in the first instance in ordering the verdict and in the second instance in certain of its instructions to the jury. On the third trial the federal court found that the law had been properly presented. The suit was for damages (predicated on negligence of defendant) because of the death of a watchman who was killed when he threw a switch because he had discovered a defect in the company's transmission line. One of the instructions by the trial judge to which exception was taken was to the effect that if the jury believed that the defendant's lines were properly constructed and inspected in accordance with the practice usually followed by light and power companies, the plaintiff could not recover. This charge was declared erroneous by the plaintiff as making the custom of other companies the test of due care in inspection, but the reviewing court held that it was not erroneous in view of another instruction dwelling on the duty of the company to make thorough inspection of its equipment at such times as reasonable care required and because there was no evidence that due care in the case at issue required anything more than the customary precautions. (33 Fed. [2d] 876.)*

*The left-hand numbers refer to the volume and the right-hand numbers to the page of the National Reporter System.

News About Electrical Men

ROBERT L. POLLARD, formerly commercial engineer with the Central Illinois Public Service Company, is now connected with a utility company with headquarters in Rio de Janeiro.

A. ROGEN, chief engineer of the municipal power plant at Granite Falls, Minn., has resigned to become superintendent of the municipal plant at Manilla, Iowa.

ROBERT E. BARNES, formerly appliance manager of the Monongahela West Penn Public Service Company, is now connected with the commercial development department of the West Penn Electric Company.

PROF. FRANCIS J. ADAMS of the electrical engineering department of the Worcester Polytechnic Institute has been granted a leave of absence. He will be connected temporarily with the New England Power Construction Company at Boston.

HERBERT A. WAGNER, president of the Consolidated Gas, Electric Light & Power Company, Baltimore, was appointed one of the members of a committee named by Mayor William F. Broening to welcome the members of the first National Air Tour, which reached Baltimore on October 9.

GEORGE H. ALLEN, manager of the service division of the Hartford Electric Light Company, Hartford, Conn., received official recognition October 2, that date marking the completion of a 30-year service record with the company. President Samuel Ferguson presented to Mr. Allen a diamond-set service pin. Mr. Allen has been manager of the service division for the past twenty years.

CHARLES R. UNDERHILL, engineer, has severed his connection with the Wappler Electric Company, Inc., and is touring the United States, partly on business and partly for recreation. For ten years Mr. Underhill was chief electrical engineer and consulting electrical engineer, respectively, for the Acme Wire Company, and for ten years was an independent consulting engineer. It was during his employment by the Western Electric Company that he became interested in coils and electromagnets in general, and resigned to become chief electrical engineer for the Varley Duplex Magnet Company. Mr. Underhill has lectured extensively in the leading colleges, has written a number of books and has been a contributor to the Standard Handbook for Electrical Engineers since 1913. He is a fellow of the American Institute of Electrical Engineers, and a member of the American Society of Mechanical Engineers and other engineering, scientific and military societies. He has been interested in radio work since 1905, when he developed a radio printing telegraph, and was a consultant for the Massie Wireless Telegraph Company. His work with the Wappler Electric Company, Inc., where he developed high-speed X-ray secondary-coil winding machines and processes, also involved the development of radio-frequency surgical apparatus, which he demonstrated in hospitals under the direction of the operating surgeons.

L. D. West Assumes New Executive Duties

L. D. West has recently been appointed vice-president of the J. G. White Management Corporation and is in charge of the new-business department. He is also vice-president of W. S. Barstow & Company. Mr. West was formerly assistant general manager of the

Metropolitan Edison Company and was associated with the General Gas & Electric Corporation for more than eleven years. Among other positions he has held since his graduation in mechanical and electrical engineering from Cornell University were power engineer for the United Light & Water Company of New England, superintendent of steam heating and valuation engineer for the Cleveland Electric Illuminating Company and secretary and treasurer of the Cuyahoga Light Company of Cleveland.

J. U. BENZIGER, superintendent of Coosa River plants for the Alabama Power Company, has resigned after more than sixteen years of service to assume new duties with the Georgia Power Company. After entering the employ of the Birmingham utility Mr. Benziger without many preliminaries demonstrated his ability to operate and maintain power plant equipment. His first job was the completion of the Gadsden steam plant. Later the wide experience he acquired in erecting, operating and maintaining equipment as head of the various Coosa River plants made his opinions on questions of design of value and he was frequently called into consultation with the engineering department.

Obituary

John Anderson

John Anderson, vice-president in charge of power of the Milwaukee Electric Railway & Light Company for the past four years, died in St. Mary's Hospital in that city October 14 after an illness of three days. He was 57 years of age. Mr. Anderson started his connection with the Milwaukee utility in 1912 as chief engineer of power plants and in that capacity he was largely responsible for the erection and successful operation of the Lakeside powdered-fuel plant, which was a pioneer in reducing operating expenses by the use of pulverized coal. He was advanced to the position of vice-president in charge of power in the summer of 1925. Mr. Anderson received his early education in Scotland and England and entered upon his engineering career in the engine rooms of the North Atlantic's liners plying between America and Europe. Subsequently he became identified with the public utility field and was appointed assistant chief engineer of power plants by the Union Electric Light & Power Company at St. Louis. He remained with that utility until 1912, when he became chief engineer of power plants with the Milwaukee company.

CHAMP S. VANCE, vice-president of the Los Angeles Gas & Electric Corporation, died suddenly October 11 in his Los Angeles office from a heart attack. Mr. Vance was 65 years of age. He had been associated with the Los Angeles Gas & Electric Corporation for more than 30 years. In 1898 he entered the employ of the Los Angeles Lighting Company, one of the predecessors of the present lighting corporation, as a solicitor. From this position he shortly became chief solicitor, later special agent, then manager of operation. In 1913 he was made vice-president and a director of the company.

WALLACE SHERMAN CLARK, pioneer in the electrical field and for many years head of the wire and cable division of the General Electric Company, died at his home in Schenectady October 11. He had been in failing health for a long time. In August last at his request he was relieved of detail work and executive management of the cable division of the company to become general consultant. He began his electrical career shortly after graduating from Sheffield Scientific School, Yale University, in 1885, joining the Edison Electric Company, New York. He became identified with the General Electric plant in Schenectady in 1887. During the World War Mr. Clark served on the war service committee of the insulated wire industry.

Financial and Statistical News

SHARP CRITICISM of certain aspects of the stock dividend policy was voiced at the Investment Bankers' Association convention at Quebec. The periodic payment of stock dividends out of relation to the actual growth in earnings was attacked. This has a close bearing on the utility industry in view of the large and increasing number of companies which pay stock dividends in one form or another. A warning also was issued concerning the speculation in utility shares.

——PUBLIC UTILITY COMMON STOCKS WERE PROMINENT in the week's selling movement, which bore the aspect of a secondary reaction.

——THE BOND MARKET, on the other hand, continues to show signs of recovery. Several utility issues advanced following strength in government aind rail bonds.

American & Foreign Power Company Expanding

With the payment on October 31, 1929, of the two quarterly dividends of $1.75 each on its second preferred stock, series A, American & Foreign Power Company, Inc., will have paid in the calendar year 1929 a total of five quarterly dividends upon this stock, as compared with only two quarterly dividends paid in 1928. The two quarterly dividends to be paid October 31, 1929, are for the period from January 1, 1929, to June 30, 1929. The report to stockholders for the twelve months ended June 30, 1929, indicated the rapid growth of the company during the last year, the combined gross earnings of subsidiary companies only from acquisition dates amounting to $45,554,230 for the twelve months ended June 30, 1929, as compared with $24,177,970 for the previous twelve months. For the twelve months ended July 31, 1929, gross earnings of subsidiary companies only from acquisition dates were $48,805,509 and net earnings (before depreciation) were $25,076,256. Gross earnings of these same properties for the full twelve months ended June 30, 1929, regardless of dates of acquisition, were $59,414,378, while net earnings (before depreciation) were $30,642,144. For the twelve months ended July 31, 1929, gross earnings on this latter basis were $63,902,364 and net earnings (before depreciation) were $32,995,625, but including only from January 1, 1929, the earnings of the Shanghai International Settlement municipal electric plant, recently acquired.

Present subsidiaries of the company supply electric power and light and other public utility service in Cuba, Argentina, Brazil, Chile, Mexico, Panama, Guatemala, Ecuador, Colombia, Venezuela, Costa Rica and in the International Settlement of Shanghai, China. Additional properties have been acquired or contracted for in several of these countries. The company also owns minority interests in companies in five other countries. At June 30, 1929, subsidiaries supplied public utility service in 693 communities, including 670 supplied with electric power and light service. Total population of the territory served by subsidiaries, including the Shanghai property, is estimated at more than 10,250,000. The company, with Argentine associates, has been making large investments in rapidly growing cities and towns in Argentina, and these acquisitions, including purchases made and firm contracts, now cover electric power and light service in 140 cities and towns in Argentina, with gross earnings from all properties acquired running, for the current calendar year, at the rate of more than $13,500,000 per annum. The company's Brazilian subsidiary has just completed the acquisition from the state of Minas Geraes of the electric power and light and tramway properties in the city of Bello Horizonte. This is the capital city of that state and has a population estimated to exceed 120,000. The company's Brazilian subsidiary at Bahia, a city in northern Brazil with an estimated population of over 300,000, has recently completed the acquisition of a municipally owned electric plant which, for several years, was competing with the private company acquired by the Brazilian subsidiary. The hydro-electric power plants in Chile, acquired in January of this year from the Whitehall interests and serving Santiago and Valparaiso in Chile, now have an output at the rate of over 250,000,000 kw.-hr. per annum, an increase of 16 per cent over the preceding year. The output of the Shanghai Power Company, the subsidiary which recently acquired the electric properties serving the International Settlement at Shanghai, China, was 528,000,000 kw.-hr. for the year 1928, and, with 40,000 kw. of new electric generating capacity placed in operation during 1929, conservative estimates of the output for the current year are in excess of 600,000,000 kw.-hr.

The Republics of South America an Central America generally are now e joying a period of material developme and increasing prosperity, and exte sive programs of new construction o railroad facilities, manufacturing plant and other public works are in progress.

Issue of Rights May Raise Hundred Million New Capital

TWO factors have brought Cities Service Company into the limelight recently. One is the fact that the company's common stock, standing almost alone, resisted the recent market liquidation without losing ground. The other is that it has just offered an issue of rights to shareholders, which, if all rights are exercised, will bring in almost $110,000,000 of new capital to the company. Probably anticipation of the latter fact had a bearing on the former.

Cities Service now has approximately 235,000 common-stock holders. The opportunity offered them is to buy additional common stock at $45 a share instead of at the current market price of around $66. One of such new shares may be purchased for every ten now held. The rights, therefore, have a value to shareholders of about $50,000,000.

The rights to buy Cities Service common stock at this special price will be issued to registered holders of record November 7 and must be exercised on or before November 30. Holders of Cities Service Company debentures to which are attached warrants to purchase common stock will also be given the opportunity to participate in the rights.

The funds from this financing, which may total as much as $110,000,000, will be used largely for further expansion, including new construction work and additions to subsidiary properties. The organization is nation-wide in scope and has more than 100 subsidiary companies which operate extensively in the public utility, petroleum and natural gas industries. It has over 500,000 security holders and 45 per cent of this number own Cities Service common stock. In 1929 the company's common-stock holders have increased from 100,000 to more than 235,000.

In the past two years two other issues of rights have proved very profitable to holders of Cities Service common stock. In March, 1928, holders were given rights on a basis of ten shares for one at $45 for the old common stock and in December, 1928, similar rights at $65. On the basis of the market price of the present shares, which represent a split-up of the old shares, holders who exercised their previous rights have a profit of from $200 to $220 on each share so purchased.

Manufacturing Activity Slightly Above 1928

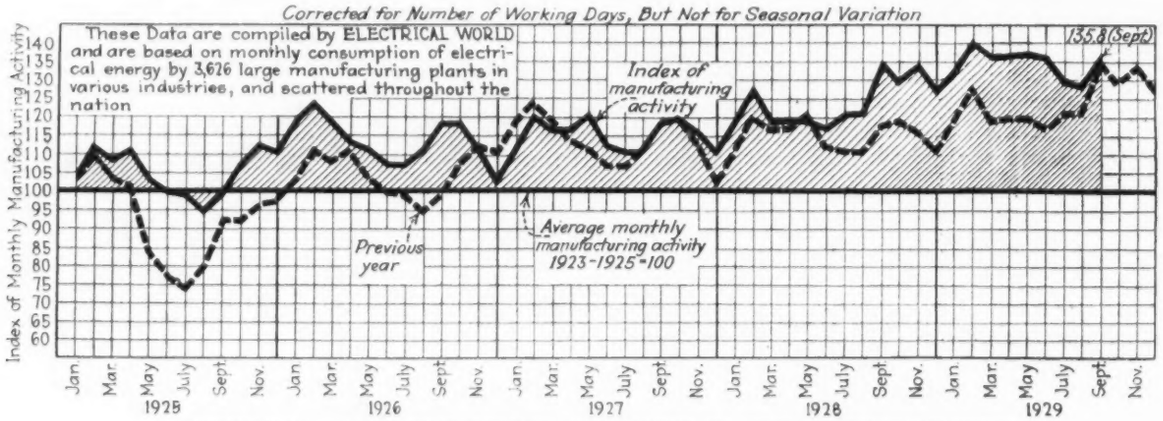
INDUSTRIAL activity of the country in September was about 1 per cent greater than in the corresponding month last year, consumption of electricity by more than 3,600 manufacturing plants indicates. Activity in the various industrial groups as compared with last year is extremely variable, as shown by the above reports received by the ELECTRICAL WORLD. Six of the primary industrial groups — chemical products, rolling mills and steel plants, metal-working plants, forest products, textiles, and stone, clay and glass—all report a rate of activity during September above that of September last year. On the other hand, five important manufacturing groups—food products, leather products, paper and pulp, rubber products, and automobiles including the manufacture of parts and accessories—report a rate of activity under September last year. Contrasted with August of the current year, however, every industrial group except automobiles registered an increase in activity.

Despite the fact that the textile group is still operating on a plane some 2.7 per cent over last year, the rate of activity is rapidly approaching the mark set during the same month last year. It seems probable, however, that the operations in the industry will continue on a plane slightly above 1928 during the remainder of the current year.

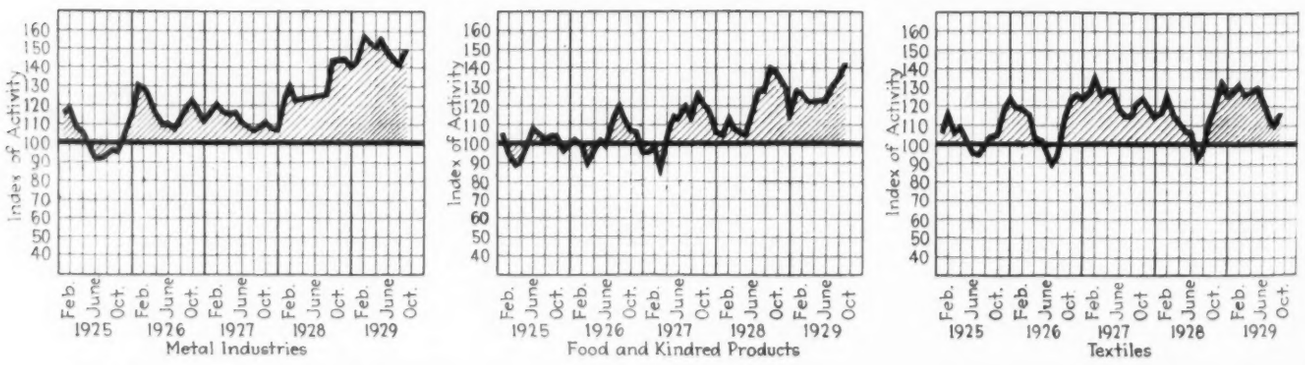
The automobile industry, including the manufacture of parts and accessories, recorded a drop in the rate of operations of about 3.4 per cent in September as compared with August and was operating on a plane about 14.2 per cent under September last year, being the third consecutive month during which the rate of operations in the industry as a whole has been under the same month in 1928. The September rate of operations was the lowest recorded for any month this year so far.

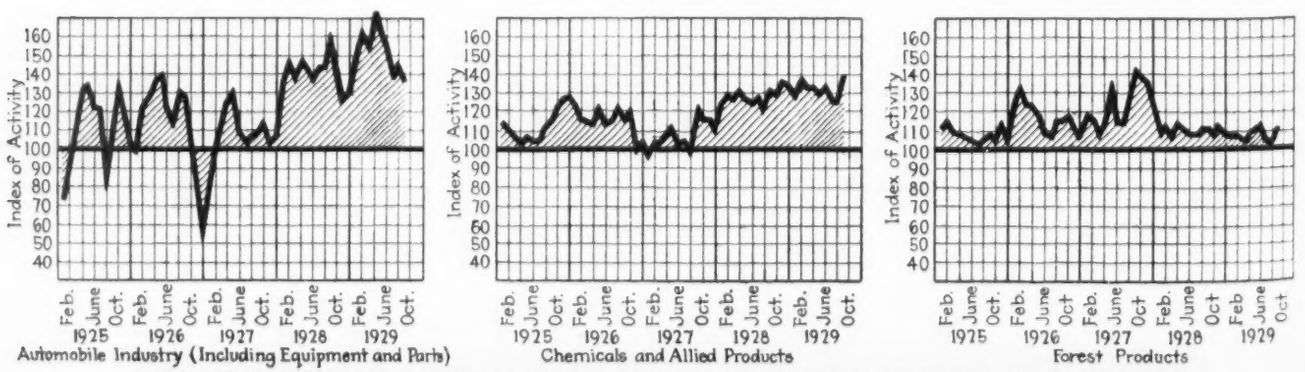
One of the outstanding gains in rate of operations during October was that recorded by the ferrous and non-ferrous metal-working plants. The September activity was the highest recorded since last April. September, 1928, however, witnessed the highest rate of activity in this industry for the year so that the current operations were only about 2.2 per cent above those of September last year. This industrial group has witnessed by far the greatest volume of business since September, 1928, in the history of the industry and bids fair to close the current year on a plane slightly above that of last year.

Comparative operations with last year in the various sections of the country exhibited various trends. September manufacturing operations in New England were 2.5 per cent greater than in the similar month last year. Plants in the Middle Atlantic states were operating at a rate 1.5 per cent above last year and manufacturing operations in the


Corrected for Number of Working Days, But Not for Seasonal Variation
These Data are compiled by ELECTRICAL WORLD and are based on monthly consumption of electrical energy by 3,626 large manufacturing plants in various industries, and scattered throughout the nation
135.8 (Sept)
Index of manufacturing activity
Previous year
Average monthly manufacturing activity 1923-1925=100
Index of Monthly Manufacturing Activity
1925
1926
1927
1928
1929

GENERAL MANUFACTURING ACTIVITY IN THE UNITED STATES





ACTIVITY IN THE PRIMARY MANUFACTURING INDUSTRIES OF THE UNITED STATES

Western States were also about 1.5 per cent above last year. The North Central states, however, recorded a drop of 3.3 per cent in the rate of activity as compared with September last year, this being the first time in 23 months that the rate of manufacturing activity has been under that of the same month in the year previous. The Southern states recorded a drop of 0.9 per cent as compared with last year.

New Capital Issues

First and refunding mortgage 5½ per cent gold bonds, series A, of the Puget Sound Power & Light Company have been offered to the amount of $8,000,000, the price being 97¾ and interest, to yield over 5.65 per cent. Proceeds from the sale of the bonds will be applied toward additions to plant and the discharge of obligations incurred in connection therewith or in connection with the payment of $4,824,000 divisional underlying bonds recently retired and to other corporate purposes. The series A and B bonds are a direct obligation of the Puget Sound Power & Light Company and are secured under the first and refunding mortgage by a direct lien on substantially all electric light and power and certain other properties owned directly by the company, subject only to divisional underlying bonds on parts of the properties.

The McGraw Electric Company has issued 76,000 shares of common stock at $38.50 per share. The company manufactures and sells through several subsidiaries various electrical equipment and appliances. Proceeds from the sale of this stock and of the public utility holdings will be used to retire the entire funded debt of the company and all mortgages and other indebtedness of the company and its manufacturing subsidiaries at present outstanding and for other corporate purposes.

Edgar Replies to Commission on Stock-Split Decision

THE position of the Edison Electric Illuminating Company of Boston in relation to the proposed stock split is set forth in President Edgar's comment on the Public Service Commission's refusal to sanction such a split. Details of the commission's decision will be found on page 805. Mr. Edgar's comments as expressed to the Boston News Bureau follow in part:

We are surprised that the commission has refused to approve the action of our stockholders in voting to change the par value of our stock from $100 to $25 a share. Since 1924 there have been three or four dozen similar applications for approval made by electric and gas companies. In every instance approval has been promptly granted, and in no case has the commission in its decision given any reason for its approval except that the stockholders have voted to make the change. The impression has been general in the industry that the commission considered changes in par value should be left largely to the judgment of the stockholders, and that its approval was in the normal case and under normal conditions more or less an administrative matter.

As we read the decision the commission appears to believe that because common stocks are selling at high prices on the stock exchanges conditions are not normal, and because our directors recently increased the dividend our company is not a normal case.

The recent phenomenal increase in the prices of common stocks is well known. This condition is not peculiar to Boston Edison, nor is it confined to public utility stocks; it is not a condition local to Massachusetts, but one which prevails generally throughout the country and affects all kinds of common stocks. Electric and gas companies throughout the state whose stock has been split are no exceptions; many of their shares are selling at market prices which yield the holders returns of 3 per cent and less. Many times in the last few years it has seemed as if the peak must have been reached and yet prices have moved still higher.

The commission appears to view the general situation with alarm and has taken this opportunity to warn the community at large and our stockholders in particular that in its opinion common stocks are not worth the prices which are now being paid for them. If Edison stock should be split four for one, the commission believes that false hopes would be raised of further increases in dividends, with the result that four of the split shares would sell at a higher price than one of the old.

The recent increase in the quarterly dividend from $3 to $3.40 a share is a factor mentioned by the commission. The increase is referred to in connection with our maximum rate, and the view advanced that the dividend should not be increased so long as the present maximum is retained. It is not stated, and, we believe, cannot fairly be contended, that either the old annual dividend rate of $12 a share or the new one of $13.60 a share is unreasonably high. The decision states that the commission, in fixing prices at which new stock shall be issued, has in the past taken care that the issue price shall not much exceed what in its opinion the stock was worth.

A very large proportion of Edison stock has been issued at $215 a share; that is, stockholders have paid $215 for a share of $100 par. A dividend of $13.60 per share would be practically 6½ per cent of $215. The $12 dividend was 5½ per cent. On the average amount paid by the stockholders for their shares the $12 dividend was a trifle over 7 per cent, and a dividend of $13.60 would be about 8 per cent. During the year 1928 the dividends paid by 30 of the larger electric and gas and electric companies in the state averaged over 9 per cent on the average amount paid by the stockholders for their shares. Comparatively, and *per se*, the Edison dividends have never been and are not high.

The $12 dividend has been paid without increase until last week for nineteen years.

Current Earnings Reports of Electric Light and Power Companies

	1929	1928	Per Cent Increase	Operating Ratio 1929	Operating Ratio 1928
American Water Works & Electric & Subs. (Year ended August 31)					
Gross earnings	$52,883,285	$50,134,315	5.5	50	52
Net earnings	26,171,612	24,029,820	8.9		
Bangor Hydro-Electric (Year ended August 31)					
Gross earnings	2,026,578	1,942,699	4.3	46	46
Net earnings	1,104,398	1,055,418	4.6	..	..
Cities Service (Year ended August 31)					
Gross earnings	39,885,689	33,450,189	10.6	..	..
Net earnings	38,657,916	32,315,254	10.6	..	..
Consolidated Gas, Electric Light & Power Co. of Baltimore (Year ended August 31)					
Gross earnings	27,397,575	25,546,138	7.2	58	60
Net earnings	11,485,200	10,141,925	11.8		
Detroit Edison (Year ended September 30)					
Gross earnings	56,272,787	50,674,704	11.0	65	65
Net earnings	19,339,288	17,423,103	11.0	..	..
Engineers Public Service & Subs. (Year ended August 31)					
Gross earnings	45,607,286	30,598,130	49.2	58	59
Net earnings	19,354,344	12,321,961	56.0	..	..
Federal Lt. & Trac. & Subs. (Year ended August 31)					
Gross earnings	8,344,747	7,586,997	10.0	59	60
Net earnings	$3,416,449	$2,993,828	14.1	..	..
Fort Worth Power & Light (Year ended August 31)					
Gross earnings	3,458,716	3,120,907	11.0	52	54
Net earnings	1,652,576	1,448,134	14.0	..	..
National Power & Light Subs. (Year ended June 30)					
Gross earnings	80,560,029	77,733,991	3.6	55	57
Net earnings	35,979,816	33,657,322	6.9	..	..
Nebraska Power (Year ended August 31)					
Gross earnings	5,781,054	5,169,156	12.0	51	53
Net earnings	2,833,694	2,433,932	16.0	..	..
Pacific Power & Light (Year ended August 31)					
Gross earnings	4,787,422	4,232,385	13.0	52	55
Net earnings	2,307,545	1,874,503	23.0	..	..
Portland Electric Power (Year ended August 31)					
Gross earnings	12,741,768	12,383,617	2.9	59	59
Net earnings	5,195,702	5,036,971	3.2	..	..
Texas Power & Light (Year ended August 31)					
Gross earnings	9,749,835	9,507,484	3.0	51	54
Net earnings	4,799,793	4,345,053	10.0	..	..
United Light & Power (Year ended August 31)					
Gross earnings	93,334,516	88,884,826	5.0	58	60
Net earnings	38,842,533	36,065,817	7.7	..	..

During that period the rates have been decreased by amounts which have saved the customers millions of dollars. Last week a further reduction, to be effective November 1, which will save customers $600,000 annually, was announced.

The commission, however, compares our maximum rate with those prevailing in Worcester, Cambridge and Springfield, and those charged by certain municipal plants, and, noting ours is higher, states its belief that our maximum should be reduced before dividends are increased. The commission concedes that the fact that we furnish lamps free and have a relatively greater amount of expensive underground distribution justifies us in charging a somewhat higher maximum than prevails in the communities mentioned; nevertheless, it intimates that the spread is too great.

In comparing with municipal plant rates, the commission minimizes the effect of the freedom of municipal plants from the taxes which privately owned companies must pay, by pointing out that Edison's tax amounted only to 5½ mills per kilowatt-hour sold. Our taxes in 1928 amounted to $3,875,000. This amount is half of the total revenue from the residence business. If we were relieved from the payment of this amount and the savings were devoted to reducing the residence rates it would enable us to cut them in half.

American Syndicate in India

An agreement has been concluded between the premier electrical industrialists Messrs. Tatas Sons, Ltd., of Bombay and an American syndicate whereby the firm of Tatas will share with the American syndicate agency of the three companies, namely, the Tatas Hydro-Electric Power Supply Company, Ltd., the Andrha Valley Power Supply Company, Ltd., and the Tatas Power Company, Ltd. The American syndicate will have a half share in the agency, which will be converted into a private limited company with seven directors.

TEXAS-LOUISIANA POWER COMPANY COMPLETES SUCCESSFUL CUSTOMER-OWNERSHIP CAMPAIGN.—The Texas-Louisiana Power Company, with general offices at Fort Worth, Tex., has brought to a successful close its first customer-ownership campaign, during which about 5,000 shares of 7 per cent cumulative preferred stock were sold to employees and customers in Texas and New Mexico. The stock campaign was carried on only in the Texas and New Mexico properties of the company, the employees being mobilized as a sales army. Distinguished service awards in the form of bronze, silver and gold pins were made to employees, according to the number of shares sold. In addition to this a cash bonus was paid for each sale.

NORTH BOSTON LIGHTING INCREASES DIVIDEND. — North Boston Lighting Properties have declared a quarterly dividend of $1 per share on the common stock, no par value, payable October 15 to holders of record October 3. The company paid quarterly dividends previously of $0.75 per share on the common.

Public Service of New Jersey Offers Preferred Stock

The Public Service Corporation of New Jersey is offering to the public through its employees and those of the subsidiary companies a limited number of shares of $5 cumulative preferred no-par value stock. The price is 95 and accrued dividends per share and payment may be made either in full or under the popular ownership plan at the rate of $5 per share at the time of subscription and $10 per share per month thereafter until fully paid for.

Czechoslovakia Electrifying

Statistics recently published in the Year Book of the Czechoslovak Electric Association show that of a total of 457 electric power stations in that country 311 are the property of power companies and 146 are operated by manufacturers. The former in 1927 generated 719,000,000 kw.-hr. with an installed capacity of 396,700 kw., while the total energy generated in Czechoslovakia in 1927 amounted to 1,700,000,000 kw.-hr., which gives an average of 125 kw.-hr. annually per capita. This is an increase by 12.5 per cent compared with 1926.

There are 13,000 miles of high-tension transmission lines in Czechoslovakia and the mileage is increasing at the rate of 17.5 per cent a year.

Of electrical manufactures the imports in 1928 amounted to 265,000,000 Czech. crowns (about $8,000,000) and exports amounted to 110,000,000 Czech. crowns ($3,300,000).

Recent Listings

The New York Stock Exchange has authorized the listing, on or after October 1, of not exceeding 4,566 additional shares of common stock of the Federal Light & Traction Company (par $15 per share) on official notice of issuance as a stock dividend, making the total amount applied for 461,263 shares.

There have also been authorized for listing on the big board 265,000 additional shares of class A stock of the International Hydro-Electric System, no par value, on official notice of issuance of payment in full, making the total amount applied for 1,319,500 shares of class A stock. The New York Stock Exchange has also authorized the listing on or after October 1 of 135,992 additional shares of common stock of the North American Company, no par value, on official notice of issuance as a stock dividend, making a total of 5,617,833 shares applied for. Additional shares of common stock of the Engineers Public Service Company has been authorized for listing in the amount of 210,781, together with 21,580 shares previously authorized but not used.

There has also been authorized the listing of 48,362,888 shares of common stock (no par value) of the Commonwealth & Southern Corporation as follows: 30,617,065 shares issued and outstanding September 3, 1929, and 16,745,823 shares on official notice of issuance against the exercise of option warrants. Also 1,000,000 shares on official notice of issuance in exchange for the securities of other companies or for cash.

The New York Stock Exchange has authorized the listing of 9,690 additional shares of class A stock (no par value) of the International Hydro-Electric System on official notice of issuance as a stock dividend of 2 per cent, making the total amount applied for 1,329,190 shares of class A stock. On the big board there has also been authorized the listing of 625,624 additional shares of common stock (par $25) of the Pacific Gas & Electric Company on official notice of issuance and payment in full, pursuant to offer to stockholders, making the total amount of common stock applied for 3,761,720 shares.

There have been placed on the Boston Stock Exchange list temporary certificates for 4,500,000 shares of the United States Electric Power Corporation without par value, common stock.

PITTSFORD POWER CALLS STOCK.—Pittsford Power Company has called for redemption 6 per cent preferred stock to the amount of $200,000 on November 1, at 110 and dividends.

INTERNATIONAL SUPERPOWER INCREASES CAPITAL.—At a special meeting at Baltimore, stockholders of the International Superpower Corporation approved the board of directors' proposal to increase the authorized capital stock to 2,000,000 no-par shares from 500,000 shares. The stockholders sanctioned the proposal to extend the powers of the corporation by removing the restrictions upon the acquisition of securities, with respect to the percentage of the assets of the corporation, which may consist of securities of specified kinds and with respect to the earnings required to be shown by the business, in whose securities the corporation may invest.

CONNECTICUT UTILITY ISSUES RIGHTS.—Preferred and common stock holders of the Connecticut Electric Service Company of record August 20 were recently given the right to subscribe for additional shares of common stock (no par value) at $75 per share on the basis of one new common share for each five shares of preferred or common stock owned. Part of the proceeds was used to retire on September 1 the 7 per cent and the 8 per cent preferred stocks, amounting to $8,500,000, of the Connecticut Light & Power Company.

MERGER APPROVED.—Stockholders of the Electric Bond & Share Company at a meeting held October 16 approved the merger with the company of Electric Investors, Inc., through an exchange of shares and authorized an increase in the capitalization from 14,500,000 no-par shares to 23,500,000 no-par shares.

Business News and Market Conditions

Unanimous Agreement on Armored Cable Standard

A unanimous agreement relative to the new tentative standard for armored cables and cords was arrived at at a recent meeting of the armored cable and metallic flexible conduit section of N.E.M.A. with representatives of the Underwriters' Laboratories. The provisions of this standard are to be applied to all new products submitted for labeling after October 1.

Some time ago the industry requested the Underwriters' Laboratories to undertake research to determine the adequacy of armored cable for the service for which it is recognized by the National Electrical Code. A detailed report of results, including various recommendations, has been under consideration.

One major improvement will be a control of the resistance of the armor to values consistent with proper fusing for the conductors involved; thereby overheating will be avoided unless currents not appropriate for the material are imposed on the armor. Changes in voltage tests and in minimum requirements for weight, dimensions and convolutions are likewise recorded in the new standard, as it is also a statement of the principles of fibrous-inclosing coverings for the conductor assemblies.

Copper Market Inactive

Dullness continues as the chief characteristic of the non-ferrous metal markets, though both lead and tin sold in somewhat larger volume than in the preceding week, the cheap offerings of tin stimulating business on Monday. Silver prices have fluctuated at slightly higher levels than a week ago. Copper, lead and zinc seem well stabilized at current quotations in the domestic market, though London quotations weakened somewhat.

No change whatever has occurred in the complexion of the copper market in the last week so far as price and volume of sales go, the quotation being uniformly 18 cents for Connecticut deliveries and 18⅛ cents in the Middle West, and the domestic business continuing to approximate a thousand tons a day.

Compared with the other non-ferrous metals the lead market gave a fairly good account of itself, total sales for the week being in excess of 5,000 tons.

New York Metal Market Prices

	Oct. 9, 1929 Cents per Pound	Oct. 16, 1929 Cents per Pound
Copper, electrolytic	18	18
Lead, Am. S. & R. price	6.90	6.90
Antimony	8.40	8.38
Nickel, ingot	35	35
Zinc, spot	7.15	7.15
Tin, Straits	43.40	42.25
Aluminum, 99 per cent.	24.30	24.30

Electrical Exports (Preliminary)

Department of Commerce

	August 1928	August 1929
Generators:		
Direct current		
Under 500 kw.	88,455	144,429
500 kw. and over	28,712	25,980
Alternating current		
Under 2,000 kv.-amp.	27,442	33,769
2,000 kv.-amp and over	137,261	59,356
Steam turbo-generator sets		
Accessories and parts for generators	58,860	56,329
Self-contained lighting outfits	74,880	64,201
Batteries:		
Flashlight batteries	193,682	176,867
Other dry and wet cell primary batteries	218,480	
Radio B and C batteries (dry)		67,788
Other, not elsewhere specified		134,347
Storage batteries	213,418	199,069
Transforming or converting apparatus:		
Power transformers, 500 kv.-amp. and over	50,513	108,028
Distribution transformers, less than 500 kv.-amp.	80,957	63,910
Instrument transformers	2,772	8,187
Other transformers, not elsewhere specified	94,101	83,243
Complete battery chargers under 15 amp.	24,007	19,591
Rectifiers, double-current and motor generators, dynamotors, synchronous and other converters	114,270	121,816
Transmission and distribution apparatus:		
Switchboard panels, except telephone	127,250	43,235
Switches, and circuit breakers over 10 amp.	153,196	174,153
Fuses and fuse blocks	37,935	40,711
Watt-hour and other measuring meters	81,823	87,483
Electrical indicating instruments	53,050	57,486
Electrical recording instruments	28,671	22,023
Other electrical testing apparatus	72,949	87,976
Lightning arresters, choke coils, reactors and other protective devices	66,616	53,642
Motors, starters and controllers:		
Motors, ¼ hp. and under	167,562	241,430
Motors, over ¼ and under 1 hp	69,763	53,315
Stationary motors		
1 to 200 hp.	229,054	354,929
Over 200 hp.	28,557	32,894
Railway motors	450	35,040
Electric locomotives		
Railway	20,000	
Mining and industrial	22,876	3,100
Station and warehouse electric motor trucks	33,698	13,278
Starting and controlling equipment		
For industrial motors	127,415	168,836
For electric railway and vehicle motors	10,269	6,703
Portable electric tools	117,201	
Portable electric tools, except automotive		90,968
Automotive electric machine tools		5,944
Accessories and parts for motors	316,646	213,270
Electric appliances:		
Electric fans	85,808	72,432
Electric lamps		
Metal filament	108,328	94,888
Other electric lamps	35,533	58,624
Flashlights	172,422	172,030
Searchlights and projectors	69,806	32,294
Motor-driven household devices		
Electric household washing machines	123,526	148,095
Electric vacuum cleaners	52,143	98,664
Other motor-driven devices except tools	40,308	76,870
Electric flatirons	43,078	36,190
Electric cooking ranges	18,489	17,823
Other domestic heating and cooking devices	75,441	75,140
Industrial electric furnaces and ovens	29,213	31,182
Therapeutic apparatus, x-ray machines, galvanic and faradic batteries, etc	151,203	132,057
Signal and communication devices:		
Radio apparatus—		
Transmitting sets and parts	74,636	390,814
Receiving sets	350,994	837,930
Tubes	73,328	130,945
Receiving-set components	313,273	398,446
Other receiving-set accessories	195,615	
Loudspeakers		178,921
Other receiving-set accessories, not elsewhere specified		365,91
Telegraph apparatus	100,238	67,49
Telephone apparatus		
Telephone instruments	51,493	53,56
Telephone switchboards	14,497	110,84
Other telephone equipment	188,484	328,838
Railway signals, switches, and attachments	53,097	181,910
Bells, buzzers, annunciators, and alarms	27,081	40,803
Other electric apparatus:		
Spark plugs	128,449	149,707
Other starting, lighting, and ignition equipment	94,543	157,399
Insulating material	114,032	122,648
Metal conduit, outlet, and switch boxes	98,528	121,087
Sockets, receptacles, and lighting switches	155,561	140,002
Electric interior lighting fixtures	157,365	177,971
Electric street lighting fixtures	48,408	31,399
Other wiring supplies and line material	101,148	108,190
Other electric apparatus, not elsewhere specified	708,009	1,002,562
Rubber and friction tape	42,522	33,340
Globes and shades for lighting fixtures	64,656	42,352
Electrical glassware except for lighting	20,864	23,352
Electrical porcelain:		
For less than 6,600 volts	54,632	124,885
For 6,600 volts and over	64,098	60,592
Carbons, carbon brushes, and electrodes:		
Electrodes for electric furnaces	200,014	175,109
Other carbon products	61,792	94,413
Insulated wire and cable, iron or steel	9,734	17,423
Copper, bare wire	146,475	200,025
Copper, insulated wire and cable	412,125	393,011
Refrigeration sets up to 1 ton capacity	419,160	
Refrigeration sets up to ¼ ton capacity		1,208,733
Refrigeration sets over ¼ to 1 ton capacity		228,571
Totals	$8,722,940	$11,898,809

Market Conditions

INDUSTRIAL ORDERS for motors and other equipment have been substantial this week on the Pacific Coast. Central-station and railroad buying is also heavy. Transmission line construction is active in the St. Louis area.

——CENTRAL-STATION EQUIPMENT, such as distribution transformers, is active in the Middle West.

——POWER STATION CONTROL AND REGULATION ORDERS are pending in New England.

——ELECTRIC RAILWAY DEMAND CONTINUES HEAVY in the Eastern district. Motors and accessory apparatus are active.

EASTERN

BUSINESS holds at a satisfactory level in the Eastern district, with active commitments from central stations and industrial interests. There is an improved call for motors and accessory apparatus for the last noted account. Electric railway demand continues as an important factor in the market and heavy purchases are being recorded; sufficient orders have come from this latter quarter to keep several manufacturers busy for a year ahead.

Anticipated business from the New York subway lines for a number of weeks past has matured and the awards are a feature of the week's transactions; the General Electric Company will furnish power equipment for the Eighth Avenue line to an amount of $2,743,174; the Westinghouse Electric & Manufacturing Company has secured the contract for railway motors and controls, etc., to the sum of $2,659,100; the Union Switch & Signal Company and the General Railway Signal Company have been awarded the order for electric block signaling and interlocking equipment to cost $5,598,750.

Central-station demand shows a steady trend, with the majority of current sales directed to substation and line apparatus. A metropolitan power company has placed an order for switchgear equipment to an amount of $50,000. A municipality in Louisiana has placed a contract with a New York manufacturer for an engine-generator unit, including switchboard and auxiliary apparatus for municipal station, totaling in excess of $90,000. A manufacturer of combustion equipment, stokers, etc., at New York has secured a heavy volume of commitments from central stations and industrial companies, totaling well over $2,000,000 in one week, including equipment for a power utility in Wisconsin, and for a steel mill in Pennsylvania; additional business is in sight. Industrial account is well divided over a group of basic industries, with the iron and steel mills, as well as metal-working plants, distinctly prominent in the call for motors, controls and kindred equipment. Paper mills are coming into the market and this branch of industry is expected to place some sizable business; a mill of this kind has given an order to a New York state manufacturer for a turbo-generator unit for an installation in Virginia, the contract for the steam equipment going to a Delaware producer. Chemical and allied industries indicate early revival in buying, and textile mills occupy a similar position in forthcoming commitments. A manufacturer of transformers in New Jersey reports trade as very active and running about 30 per cent in advance of this time a year ago. Electric refrigerator business continues at a satisfactory level; a leading manufacturer in the Middle West says that shipments were more than 50 per cent greater in September than in this same month of 1928. Demand for airport lighting equipment shows encouraging strength and sizable transactions are going forward. Construction projects follow:

Carbide & Carbon Chemical Corporation, New York, will build a synthetic alcohol plant at South Charleston, W. Va., to cost $1,500,000. New York Power & Light Corporation, Albany, plans additional unit at hydro-electric power plant at Spier River Falls, to increase capacity by 52,000 hp., with project to include transmission line extensions. Topping Brothers, Inc., New York, has filed plans for an addition to marine hardware plant to cost $300,000. Signal Supply Officer, Signal Corps, Brooklyn, N. Y., will receive bids until October 29 for power plant parts, and at the same time for 300 condensers, 100 switches, etc. New York City Airport, Flushing, L. I., plans airport buildings and floodlighting system, entire project to cost $500,000. American Cigar Company, New York, plans plant at Kansas City, Mo., to cost $3,000,000. Matheson Alkali Works, Inc., Niagara Falls, N. Y., plans plant at Newark, N. Y., to cost $75,000. Buffalo *Courier-Express*, Buffalo, N. Y., has filed plans for printing plant to cost $450,000. Thames Trading Company, Brooklyn, N. Y., will build a factory to cost $300,000. New York Trade School, New York, has filed plans for institutional building to cost $500,000. Queens County Motor Car Company, Douglaston, N. Y., plans plant at Briarwood, N. Y., to cost $200,000. Sonatron Tube Company, Newark, N. J., is said to be planning call for bids on revised plans for plant addition to cost $100,000. Atlantic Silk Hosiery Company, Paterson, N. J., plans plant at Butler, N. J., to cost $80,000. National Biscuit Company, New York, plans baking plant at Newark, N. J., to cost $350,000. Jacques Wolff Company, Clifton, N. J., contemplates rebuilding of portion of chemical plant, recently destroyed by fire with loss reported in excess of $75,000. Wallace & Tiernan Company, Inc., Belleville, N. J., contemplates addition to chlorine equipment manufacturing plant, reported to cost $70,000. Reading Company, Philadelphia, Pa., has filed plans for an electric car repair shop to cost $225,000. Department of City Transit, Philadelphia, Pa., will receive bids until October 25 for station control equipment for the Broad Street subway. Francis A. Bruner, Inc., Philadelphia, Pa., has plans for an addition to cotton mill to cost $135,000. Babcock & Wilcox Tube Company, Pittsburgh, Pa., will build addition to plant at Beaver Falls, Pa., to cost $400,000. Pittsburgh Plate Glass Company, Pittsburgh, Pa., plans additions to paint and varnish factory at Milwaukee, Wis., to cost more than $1,000,000. Temple University, Philadelphia, Pa., plans institutional building to cost $1,400,000. Gulf Refining Company, Pittsburgh, Pa., plans oil storage and distributing plant at Baltimore, Md., reported to cost $400,000. International Paint Corporation, St. Helena, Md., plans addition to factory to cost $80,000.

NEW ENGLAND

BUYING in this district continues steady. Industrial power equipment sales are leading in interest; small motor sales continue in good volume; scheduled materials are in demand due to stocking up. Central station equipment orders to be placed soon are of note; orders amounting to about $50,000 will soon be placed for new power station control and regulation equipment by a Maine company; outside station control equipment amounting to about $30,000 will be ordered very soon by a Massachusetts company for substation additions.

Insulator sales are steady. Transformer sales are spotty; recently orders were placed for a number for new line control in eastern Massachusetts. Negotiations for heavy machinery are increasing; interest in generator sets and motor drive is active; negotiations include electrification of two textile mills which will require 2,100 hp. in motors. Industrial interior electric lighting is gaining in interest; installation of 500-watt units in an Eastern factory was noted; other similar projects are under consideration. Street lighting is gaining; lighting facilities recently improved include the installation of 22 2,000-watt lights for a southern New England playground and the installation of over 230 new lights for a southern Massachusetts city. Merchandising is encouraging; range sales are increasing; last week a gain of over 12 per cent in receipts was reported by a prominent group of central stations; radio is active. Construction projects follow:

C. I. Brink, Inc., Boston, Mass., will build electric sign manufacturing plant to cost about $50,000. The Rubel Ice Company, Boston, Mass., has plans for an ice-

manufacturing plant to cost $100,000. Transcript Publishing Company, Holyoke, Mass., will build printing plant to cost in excess of $100,000. Norton Company, Worcester, Mass., has plans for an abrasive material manufacturing plant at Chicago, Ill., to cost $100,000.

Pacific Coast

CENTRAL-STATION buying on the Pacific Coast is fair and railroad buying is good. Contractors are working good crews, but report few new jobs in sight; dealers are ordering fairly heavily for the holidays. Prices are steadier, with a 5 per cent increase on all standard wiring schedule material.

Industrial ordering covers many medium-sized motors and such apparatus items as oil well gearing machinery worth $15,000 for Los Angeles, a $40,000 Westinghouse switchboard for a lumber plant at Longview, two storage battery locomotives worth $15,000 with batteries and accessories for the Cushman tunnel project, three storage battery locomotives at $17,500 for a car plant at Yakima and Westinghouse machinery totaling $100,000 for a Portland paper plant, consisting of condensers, transformers and a sectional paper mill machine drive. Prospective power company business covers a $50,000 order for disconnecting switches, a new substation for Monterey, a reflector and fitting job for a warehouse and garage, a $120,000 substation at Banning and a $100,000 municipal plant at Fallon, Nev. Prospective railroad business covers a $1,000,000 addition to the Southern Pacific hospital at San Francisco and a $750,000 traffic control system for the 40-mile single track between Stockton and Sacramento, of which about $300,000 will be spent for signaling and $50,000 for line material. Other interesting construction covers two new junior high schools for San Francisco costing about $700,000 and a new Diesel ferryboat, value $600,000, for San Pedro.

An ordinance was introduced in the Tacoma City Council appropriating $40,000 for engineering studies on an additional power project with claimed total available horsepower of 80,000 continuous generation and options on sites secured. The Stone & Webster Engineering Corporation is reported to be writing specifications for switchgear for the second unit of the Shuffleton steam plant, Seattle, duplicating the first unit.

Sales reported by Seattle dealers last week included three 1,000-kva. transformers for the Mountain States Power Company at Kalispell. One Seattle jobber reports the sale of 30 motors from 75 hp. down to dealers and industrials, another fifteen machines from 100 hp. down to sawmills and another twenty from 25 hp. down for woodworking and pulp plants. The city of Tacoma opened bids for furnishing 60 1,000-watt outdoor floodlights. Bellingham, Wash., is considering an ice and cold storage plant costing between $150,000 and $200,000 and a chair factory with a capacity of 3,000 chairs per day is assured Aberdeen, Wash. Inquiries for electric heating units are increasing and lamp sales to industrials are showing pronounced improvement. Construction projects follow:

Oak Valley Lumber Company, Camptonville, Calif., plans rebuilding of portion of mill, recently destroyed by fire with loss of $100,000. Willard Storage Battery Company, Cleveland, Ohio, has filed plans for a power plant at new factory at Los Angeles, Calif., to cost more than $70,000. Southern Sierras Power Company, Riverside, Calif., plans addition to steam-operated electric power plant at San Bernardino, Calif., and will build transmission line to Seal Beach, to cost $200,000. State Board of Harbor Commissioners, San Francisco, Calif., plans extensions and improvements in coal storage and refrigerating plant to cost $200,000. Scientific Feed Manufacturing Company, Anaheim, Calif., plans plant at Spardra, Calif., to cost $90,000. Olympic Forest Products Company, Port Angeles, Wash., has approved plans for a pulp mill to cost $2,000,000. Seattle, Wash., plans ornamental lighting system to cost $215,000.

Southwest

CONDITIONS in this district are keeping up to satisfactory standard in every phase. Transmission line construction materials are moving in good volume.

Business in radio apparatus and all merchandising contracts closed are as follows: Three transformers, 2,000 kva., 66,000 volts, for a Texas power company, costing $20,000; a lot of instrument transformers and connections on busbars for a water power line to a local substation, costing $10,000; poles and all construction materials for two "White-way" installations in small cities costing $12,000 each and two exhaust fans for factory heating and ventilation costing $3,000. Jobbers report that orders for Christmas trade delivery are coming in in good quantity. Construction projects follow:

Empire District Electric Company, Joplin, Mo., has closed agreement with city for an ornamental lighting system. Eagle Elevator Company, Kansas City, Mo., has plans for grain elevator to cost more than $125,000. Junction City, Kan., has plans for a municipal electric light and power plant to cost $425,000. Buckley Aircraft Company, Wichita, Kan., plans aircraft manufacturing plant to cost about $70,000. Swift & Company, Chicago, Ill., plans meat packing plant at Ardmore, Okla., to cost $130,000. Continental Oil Company, Denver, Colo., plans extensions and improvements in oil refining plant at Ponca City, Okla., to cost $200,000. Southwestern Gas & Electric Company, Shreveport, La., plans transmission line at Rogers and Avoca, Ark., and vicinity, reported to cost $75,000. Cleburne, Tex., contemplates municipal electric light and power plant to cost more than $75,000. Pasotex Petroleum Company, El Paso, Tex., plans extensions and improvements in oil refinery to cost $1,000,000. The West Texas Utilities Company, Abilene, Tex., plans extensions in transmission lines at Miles, Tex., and vicinity to cost $30,000. The Central Power & Light Company, San Antonio, Tex., contemplates hydro-electric power plant on Devils River, near Del Rio, Tex., to cost about $1,000,000; will also make extensions and improvement in steam-operated electric power plant at Presidio, Tex., to cost about $100,000. Waco, Tex., plans ornamental lighting system. Baton Rouge, La., plans installation of floodlighting system and beacon lamps at proposed airport. The Sugar By-Products Corporation, New Orleans, La., plans alcohol distilling and by-products plant to cost $400,000. Slidell, La., plans municipal electric light and power plant to cost $100,000.

Middle West

A SLIGHT acceleration of general business was noticeable this week in the Middle West section. The major activities are in a favorable position, although steel and automotive production have suffered somewhat. Considerable construction activity is going on in the coal mining sections of southern Illinois. There has been a good demand for apparatus and distribution equipment.

Some of the interesting orders placed this week include 100 10-kva. and 100 15-kva. single-phase, 2,300-volt pole type distribution transformers, 80,000 gal. transformer oil, two high-speed, 3,000-amp., 650-volt direct-current air circuit breakers, two 4,000-amp., 650-volt direct-current swichboard panels, one steam separator unit complete with appurtenances, motor-driven air compressor and automatic vacuum tripper.

Jobbers' sales are normal. Considerable municipal and railroad business is being obtained, which, together with increased industrial activity, is resulting in increased sales for the jobber. There has been a good demand for most appliances, particularly toasters, waffle irons and headlight heaters. Construction projects follow:

Eau Claire Baking Company, Eau Claire, Wis., plans baking plant to cost $100,000. Motor Tool Specialty Company, Chicago, Ill., plans plant at Kenosha, Wis., to cost $140,000. Milwaukee Electric Railway & Light Company, Milwaukee, Wis., plans addition to power plant to cost more than $2,000,000. Detroit Edison Company, Detroit, Mich., plans addition to power substation to cost $175,000. Ex-Cell-O Aircraft & Tool Corporation, Detroit, Mich., contemplates power plant to cost about $60,000. Dare Airplane Company, Detroit, Mich., plans aircraft manufacturing plant at Milan, Mich., to cost about $90,000. Commonwealth Edison Company, Chicago, Ill., plans power substation to cost $50,000. Douglas Iron Works, Inc., Chicago, Ill., will build ornamental and general iron works to cost $100,000. Hafner Manufacturing Company, Chicago, Ill., plans mechanical toy manufacturing plant to cost $90,000. Marvin Radio Tube Corporation, Chicago, Ill., plans extensions and improvements in factory, reported to cost more than $100,000. Sherwin-Williams Company, Cleveland, Ohio, plans plant at Chicago, Ill., to cost $100,000. Central Illinois Public Service Company, Springfield, Ill., plans addition to power substation at Muddy, Ill., to cost $40,000, and power substation at Roodhouse, Ill., to cost $50,000. Sullivan Shoe Factory Associates, Sullivan, Ill., plans shoe factory to cost $140,000. American Steel & Wire Company, Chicago, Ill., plans additions to mill

at Waukegan, Ill., to cost $800,000. Bendix Aviation Corporation, South Bend, Ind., plans addition to airplane equipment plant to cost $400,000. Blackford Window Glass Company, Vincennes, Ind., contemplates sheet glass plant to cost $100,000. Goodyear Tire & Rubber Company, Akron, Ohio, plans multi-unit tire and rubber mill at La Plata, Argentina, reported to cost $5,000,000. Cities Service Oil Company, St. Paul, Minn., contemplates oil storage and distributing plant to cost about $100,000. Rollins Hosiery Mills, Inc., Des Moines, Iowa, plans addition to cost close to $100,000.

SOUTHEAST

ELECTRICAL business in the Southeast is satisfactory with the volume of small orders on the increase. There is some pick-up to be noted in industrial business and the outlook in the industrial and central-station fields for the remainder of the fall is bright. Floodlighting is coming in for considerable attention, but individual orders are small.

One company's distribution and small power transformer orders last week aggregated $14,000, while its creosoted pine pole purchases in the past ten days totaled $14,300. Some other central-station orders were for $7,700 of cable, $7,500 of air break and disconnect switches, $6,800 of storage batteries, $4,200 in conduit, and 30,000 lb. of No. 2 and No. 6 bare solid and stranded weatherproof copper wire. Contracts were recently let on a textile mill electrification in Alabama which will require $20,000 in electrical materials and equipment and on a textile mill addition in the same state which will call for $18,000 in electrical equipment and wiring. A steel mill in the Birmingham district ordered $15,000 of switching equipment and a cotton mill in the state placed an order for $5,000 in motor equipment. An ice plant being constructed in southwest Georgia ordered $10,000 worth of motors, transformers and wiring materials, while a Georgia textile plant ordered $5,000 in mill wiring supplies. A street-lighting equipment order amounting to $2,500 was received from Mississippi. Construction projects follow:

Catona Mining Company, East Lynn, W. Va., plans power plant at coal mining properties, reported to cost more than $75,000. Mississippi Power & Light Company, Jackson, Miss., plans extensions and improvements in power substations and lines in vicinity of Greenville, Miss., to cost $70,000. Mississippi Power Company, Gulfport, Miss., plans extensions in transmission lines in vicinity of Picayune, Miss., reported to cost $25,000. Cordele, Ga., has authorized a bond issue of $85,000, for a municipal electric power and light distributing system. Rome, Ga., plans municipal electric light and power plant to cost $300,000. Southern Building Products Corporation, Savannah, Ga., plans roofing and building materials manufacturing plant to cost $500,000. Ocala, Fla., plans installation of floodlighting system. Tampa, Fla., plans installation of floodlighting system and beacon lamps at proposed airport.

Activities of the Trade

General Electric Orders Up 29 per Cent

Orders received by the General Electric Company for the three months ended September 30 amounted to $116,688,014, compared with $90,328,666 for the corresponding quarter of 1928, an increase of 29 per cent, President Gerard Swope has announced.

For the nine months ended September 30, orders received amounted to $337,404,470, compared with $260,686,463 for the first nine months of last year, also an increase of 29 per cent.

Allis-Chalmers Receives Power Equipment Orders

Allis-Chalmers Manufacturing Company has received during the past week orders covering heavy power plant equipment for three utility companies, aggregating approximately $2,000,000.

One order, covering six 33,500-hp. hydraulic turbines, together with parts for two additional units, is the largest order for hydraulic machinery Allis-Chalmers has received since that for the Conowingo development of the Philadelphia Electric Company a few years ago, both amounting to approximately $1,000,000. This is for the Osage development of the Union Electric Light & Power Company, St. Louis, Stone & Webster Engineering Corporation, engineer.

A 30,000-kw. steam turbine unit has been ordered for the Oklahoma Gas & Electric Company, a Byllesby property, being the second unit of this size recently furnished that company.

Two large umbrella type waterwheel generators, each of 31,111 kva. capacity, for the Carpenter development of the Arkansas Power & Light Company, near Hot Springs, Ark. were purchased by the Phoenix Utility Company, the engineering division of the Electric Bond & Share Company.

Electro-Master Takes Over Detroit Edison Range Business

Electro-Master, Inc., a new company with assets of over a million dollars, has been organized to take over the new electric range manufacturing business developed during the last year by a subsidiary of the Detroit Edison Company, the Edison Illuminating Company of Detroit. The new company owns all the assets of the range manufacturing venture. The factory, which has been in production since the first of September, is now completely equipped for production.

The new company is headed by Warren Noble, president. Other officers are Richard B. Marshall, vice-president and general manager; William C. Klann, vice-president; McKee Robison, secretary-treasurer.

In discussing the change of ownership, Alex Dow, president of the Detroit Edison Company, said: "The Detroit Edison Company is now assured that it can secure the product the urgent need for which started the manufacturing project. We have built in "Electrochef" the sort of stove our customers have been waiting for and we believe that the new company will continue to supply "Electrochefs" in large quantities both locally and to other public utilities.

"It has not been the intent of the Edison company to engage permanently in the manufacture of this or any other electric appliance. "Electrochef" was designed and offered to the industry because of the conviction that something radical had to be done to encourage residential electric cooking. The factory was established to show that the job could be done."

Los Angeles Plans New Pumping Station

The city of Los Angeles, Calif., has made plans for the erection of a new pumping station for transferring water from the reservoir outside of the city into city mains. Electrical equipment for use in this station has been ordered from the Westinghouse Electric & Manufacturing Company. The new pumping plant will be capable of moving practically 45,000 gal. of water per minute against the head of 225 ft. The plant consists of four pumping stations. The small pumps are to be furnished by the De Laval Steam Turbine Company, Trenton, N. J.

Claude Neon Lights, Inc., Announces White Light

Announcement is made by Claude Neon Lights, Inc., that Claude Neon National Laboratories have developed a white light—an electric gaseous tube light of great brilliance, distant visibility and low electric current consumption. This is the company's latest development following the production of lights of various colors.

COPELAND PRODUCTS, INC., announces that William S. Race has been appointed manager of advertising and sales promotion.

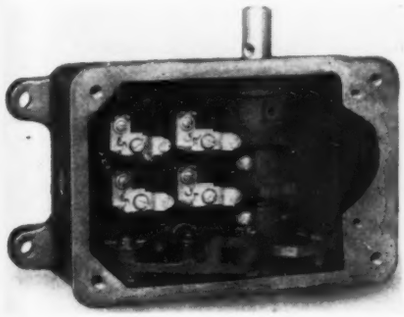
STANLEY P. ROCKWELL COMPANY, metallurgical and heat treating engineer, has a new plant at 296 Homestead Avenue, Hartford, Conn., equipped for the manufacture of dilatometers and also designed and equipped for commercial heat treating by gas and electrical methods.

New Equipment Available

Cam-Operated Limit Switch

A new cam-operated limit switch for industrial control application which supersedes the various older types is announced by the General Electric Company. The new model bears the designation LS-438.

The new switch is inclosed in a cast case. Electrically it is a two-circuit



switch that by simple adjustment can be made either normally open or normally closed or one circuit open and one closed. It is a snap-action, cam-operated device and can be obtained with either spring or star-wheel return with any one of four operating levers, a roller lever with a 1-in. or 3-in. roller, a forked lever or a straight lever. The contact tips are interchangeable with those of General Electric cam-operated master and geared limit switches.

Redesigned Motor Starters Have New Meters and Relays

The new rectangular type of meter with non-glare glass and new type of field-actuating relay are incorporated in the synchronous motor starters which have just been redesigned by the General Electric Company. CR-1135 is the designation of a line of semi-magnetic reduced voltage starters for synchronous motors, designation CR-7061 covers magnetic reduced voltage starters and designation CR-7065 is assigned to a line of magnetic full-voltage starters for synchronous motors, all having been revised to incorporate the new devices.

The operation of the new field-actuating relay which controls the field contactor is dependent upon the speed of the motor and in addition a definite time delay after the motor reaches approximately 95 per cent speed. When full voltage is applied to the motor the immediate closing of the relay contacts is prevented by a lock-out coil, in parallel with the discharge resistor and energized by the voltage across this resistor.

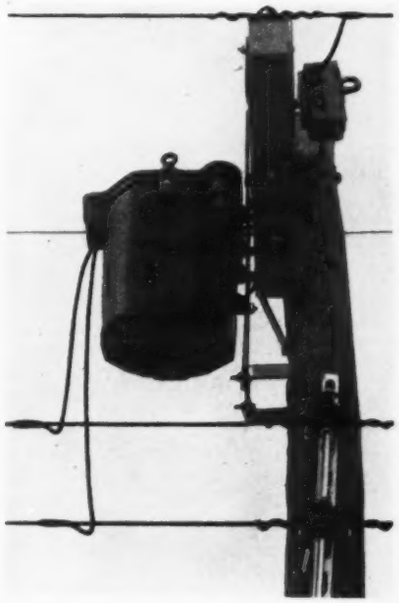
The lock-out coil holds the relay contact arm motionless until the motor accelerates to approximately 95 deg. of synchronous speed, when the voltage across the resistor decreases and allows the lock-out coil to release the timing mechanism. After the predetermined time the relay contacts close, energizing the field contactor and applying field to the synchronous motor. The closing of the relay contact may be delayed for several seconds after the lock-out coil releases the timing mechanism. This insures that the motor will accelerate its load to the maximum possible speed before the field voltage is applied.

Transformer Brace Eliminates Lower Crossarm

A new transformer brace which eliminates the use of a lower crossarm ordinarily required for supporting transformers is announced by the Line Material Company, South Milwaukee, Wis. It is claimed by the manufacturer that the use of these braces considerably reduces the cost of transformer installation in that it eliminates the cost of a two-pin arm and also the labor of gaining the pole for this arm.

An additional advantage claimed is that of saving space on the pole and providing additional room for secondary racks which can be placed much higher on the pole than when a crossarm is used. This brace is attached to the transformer while on the ground, eliminating the additional labor cost required on the pole where crossarms are used. The amount of material to be transported to the job is considerably less, as well as requiring less space in carrying the equipment.

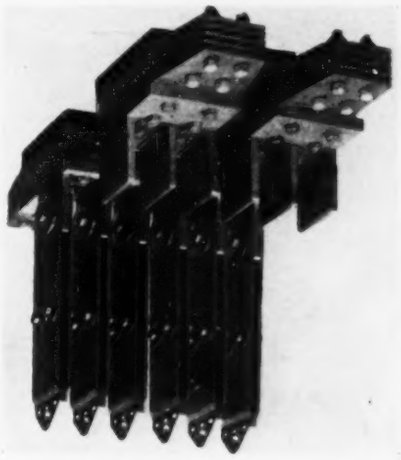
The brace is made in three sizes, the



small size for transformers up to 5 kva., medium size for transformers of 7½ to 15 kva. and a larger size built for transformers of from about 15 kva. to 50 kva.

Disconnecting Switch for Insulator Mounting

A heavy-duty line of disconnecting switch units, which can be mounted on various types of insulators as desired, is announced by the Delta Star Electric Company, Chicago, Ill. The accompany-



ing illustration shows a 10,000-amp. multi-blade tongue type switch unit ready for attaching to its insulator.

Portable Combination Centrifuge and Filter Press

What is said to be the largest portable combination centrifuge and filter press on the market is now being offered through the Westinghouse Electric & Manufacturing Company. It is the Sharples combination portable super-centrifuge and filter press and is made by the Sharples Specialty Company. A Sharples super-centrifuge is combined with Westinghouse filter press equipment and mounted on a truck. The following advantages are claimed for it:

Thoroughly cleans 1,200 gal. of oil per hour continuously, purification is complete in one operation, operation is simple and clean, practically no oil is lost in handling, construction is sturdy and simple, maintenance is remarkably low, occupies very little floor space, only 54 x 106 in., and can be easily moved from place to place.

This outfit fills the needs of those who have large amounts of oil to clean quickly and satisfactorily.

TYPE T METAL IS A NEW ALLOY furnished in the form of welding rods for applying a highly wear-resistant surface by either the oxyacetylene or metallic arc-welding process. It is claimed that it generally outwears the next hardest surfacing material by two to one or better, according to the producer, the Fusion Welding Corporation, Chicago. The T metal has ductility, which gives to it unusual properties. The properties of weldite type T metal depend not only on the alloy content of the deposit but upon the ratio of the carbon content to this alloy content.

Electrical Patents

Announced by U. S. Patent Office

(Issued September 24, 1929)

1,729,356. Duct-Forming Device and Method; T. E. Murray, Brooklyn, N. Y. App. filed May 21, 1924.

1,729,364. Automobile Vacuum-Cleaner Switch; W. C. Schwier and N. V. Schaaf, Indianapolis, Ind. App. filed March 14, 1927.

1,729,385. Electric Switch; B. F. W. Heyer, Montclair, N. J. App. filed May 29, 1925.

1,729,402. Alternating-Current Motor Meter; A. R. Rutter, East Pittsburgh, Pa. App. filed Aug. 20, 1924.

1,729,404. Time-Element Selective Relay; H. P. Sleeper, Wilkinsburg, Pa. App. filed Sept. 23, 1921.

1,729,405. Relay System; H. P. Sleeper, Wilkinsburg, Pa. App. filed April 7, 1922.

1,729,406. Protective Apparatus for Distribution Systems; H. P. Sleeper, East Pittsburgh, Pa. App. filed Oct. 21, 1924.

1,729,416. Battery Depolarizer; B. K. Brown, Terre Haute, Ind. App. filed July 7, 1925.

1,729,421. Starter Gear; H. Ford, Dearborn, Mich. App. filed June 16, 1928.

1,729,429. Electrolytic Rectifier; E. F. Lundeen, Cleveland Heights, Ohio. App. filed April 14, 1927.

1,729,451. Station Indicator; H. M. Ocko, Monsey, N. Y. App. filed Oct. 5, 1927.

1,729,455. Automatic Station; M. E. Reagan, Swissvale, Pa. App. filed Oct. 5, 1926.

1,729,456. Control System; S. B. Schenck, Wilkinsburg, Pa. App. filed Feb. 19, 1927.

1,729,483. Coupling for Pipes or Conduits; C. F. Koch, Buffalo, N. Y. App. filed Jan. 15, 1927.

1,729,492. Coil; L. B. Sauer, Western Springs, Ill. App. filed Jan. 30, 1928.

1,729,500. Means for Indicating Quantities Required for the Correct Operation of Continuous Processes; G. W. Bost, Hillingdon, England. App. filed Oct. 15, 1928.

1,729,517. Electrical Measuring Instrument; J. Neale, London, England. App. filed Feb. 13, 1929.

1,729,532. Electrical Insulator; O. P. Ziesche, Hermsdorf, Thuringen, Germany. App. filed Feb. 2, 1928.

1,729,538. Electric Switch Gear; F. Coates, Cleadon, and J. Mirrey, East Boldon, England. App. filed July 6, 1926.

1,729,561. Thermal-Control System; V. G. Vaughan, Mansfield, Ohio. App. filed May 6, 1926.

1,729,587. Electric Liquid Heater; B. W. Macy, Jacksonville, Fla. App. filed June 4, 1928.

1,729,591. Electric Signaling Device for Automobiles; D. F. Murphy and L. Cotter, Denver, Colo. App. filed July 6, 1922.

1,729,595. Distance Measuring Device; H. C. Hayes, Washington, D. C. App. filed March 23, 1927.

(Issued October 1, 1929)

17,453 (reissue). Thermostatic Switch; E. Klahn and F. I. Mullen, New Vernon, N. J. App. filed Jan. 21, 1922.

1,729,607. Process for Electrodeposition of Metal; F. K. Bezzenberger, Cleveland, O. App. filed July 14, 1921.

1,729,609. Medical Electric Lamp; W. H. Clifford, Ealing, London, England. App. filed Sept. 21, 1928.

1,729,613. Electrical Connecter; L. Gross, Cleveland, O. App. filed Dec. 17, 1925.

1,729,616. Signal Switch Device for Motor Vehicles; F. W. Johnson, St. Paul, Minn. App. filed July 27, 1927.

1,729,618. Alternating-Current Motor; K. Landsmann, Mannheim, Germany. App. filed March 17, 1927.

1,729,622. Automatic Starting Switch; R. J. Mackie, Kansas City, Mo. App. filed Aug. 17, 1925.

1,729,637. Conductor Support for Lift Bridges and the Like; W. G. Williams, Flushing, N. Y. App. filed Feb. 17, 1927.

1,729,647. Therapeutic Lamp; W. H. Clifford, London, England. App. filed Sept. 6, 1928.

1,729,656. Protective Device for Trolley-Wire Hangers; C. A. Cawood, Big Stone Gap, Va. App. filed April 26, 1927.

1,729,662. Combined Waffle Iron and Cooking Apparatus; J. S. Guest, Los Angeles, Calif. App. filed Dec. 22, 1927.

1,729,673. Electrical Heating Element; A. J. Kercher, Berkeley, and W. W. Hicks, San Francisco, Calif. App. filed Dec. 13, 1926.

1,729,678. Duplex Flush Receptacle; H. J. Morey, Syracuse, N. Y. App. filed April 13, 1925.

1,729,685. Electric Water Heater and Steam Generator; M. J. Rees, Lincoln, Kan. App. filed April 14, 1928.

1,729,691. Insulator; H. B. Smith, Worcester, Mass. App. filed May 10, 1922.

1,729,699. System of Electric Distribution; H. Bany, Yeadon, Pa. App. filed Jan. 31, 1928.

1,729,702. Insulator Supporting Means; E. W. Brady, New Britain, Conn. App. filed Jan. 21, 1928.

1,729,704. Adjustable Condenser; C. A. Brokaw, Scotia, N. Y. App. filed Dec. 10, 1927.

1,729,713. Inductive Alternating Current Regulator for Bus Bars; O. H. Dicke, Rochester, N. Y. App. filed May 19, 1921.

1,729,715. Electric Discharge Device; L. W. Evans, Pittsfield, Mass. App. filed Dec. 2, 1927.

1,729,718. Switch for Alarm Clocks; H. Green, Toronto, Ont., Canada. App. filed May 23, 1927.

1,729,720. Thermostatic Control for Ice Machines and the Like; W. G. Hartwig, Chicago, Ill. App. filed April 3, 1920.

1,729,726. Variable Rotary Condenser; D. R. Lovejoy, New York, N. Y. App. filed July 30, 1927.

1,729,730. Lighting Fixture; J. Schaffer, New York, N. Y. App. filed Dec. 17, 1927.

1,729,735. Switch; W. J. Chiles, Wiggins, Miss. App. filed May 1, 1928.

1,729,740. Attachment Plug Cap; A. C. Gaynor, Stratford, Conn. App. filed Nov. 4, 1924.

1,729,753. Rectifier Circuits; C. E. Stryker, Highland Park, and E. W. Lincoln, Chicago, Ill. App. filed July 21, 1927.

1,729,755. System of Electrical Distribution and Control Means Therefor; P. F. Williams, Chicago, Ill. App. filed Feb. 26, 1925.

1,729,756. Electric - Switch - Operating Mechanism; J. D. Wood, Wollaston, Mass. App. filed June 4, 1926.

1,729,757. Switch-Operating Mechanism; J. S. Wood, Wollaston, Mass. App. filed June 30, 1926.

1,729,777. Electrically Heated Water Boiler; H. Hargreaves, Burnley, England. App. filed Aug. 8, 1928.

1,729,800. Theft Alarm or Signal for Motor Driven Vehicles; E. E. Scott, Denver, Colo. App. filed Oct. 27, 1924.

1,729,810. Electric Heating Arrangement for Heating the Cooling Water of Combustion Engines; K. Witzel, Zuffenhausen, Germany. App. filed Nov. 10, 1928.

1,729,859. Electric - Switch - Operating Mechanism; C. D. Ainsworth, Wollaston, Mass. App. filed Dec. 13, 1922.

1,729,860. Electric Switch; C. D. Ainsworth, Wollaston, Mass. App. filed Feb. 18, 1927.

1,729,864. Switch Mechanism; J. M. Brown, Deceased, late of Pittsburgh, Pa. App. filed Dec. 20, 1926.

1,729,866. Corn Popping Apparatus; C. Cretors, Chicago, Ill. App. filed Dec. 12, 1927.

1,729,869. Electric Steering Gear for Ships; R. Elsässer, Berlin-Charlottenburg, Germany. App. filed Oct. 11, 1924.

1,729,871. Voltage Relay; J. H. Graybill, Forest Hills, Pa. App. filed Feb. 17, 1928.

1,729,873. Terminal for Electric Conductors; P. M. Hengstenberg, Wilkinsburg, Pa. App. filed July 14, 1927.

1,729,874. System of Control; H. D. Adams, Edgewood Park, and H. C. Nagel, Wilkinsburg, Pa. App. filed March 1, 1923.

1,729,875. Switch; H. D. James, Edgewood, Pa. App. filed Nov. 29, 1921.

1,729,876. Control Apparatus; H. D. James, Swissvale, and C. H. Hodgkins, Pittsburgh, Pa. App. filed Oct. 24, 1922.

1,729,877. Fuse Panel Box; O. S. Jennings, Brooklyn, N. Y. App. filed Oct. 29, 1920.

1,729,882. Control System; B. G. Lamme, Pittsburgh, and L. J. Hibbard, Wilkinsburg, Pa. App. filed Jan. 25, 1924.

1,729,880. Fuse Panel; H. K. Krantz, Rockville Center, and H. G. Baxter, Baldwin, N. Y. App. filed June 8, 1927.

1,729,900. Guard for Trolley Conductors and Hangers; W. Schaake, Pittsburgh, Pa. App. filed March 28, 1927.

1,729,904. Trolley Ear; J. H. Stotlemeyer, Wilkinsburg, Pa. App. filed Sept. 2, 1926.

1,729,907. Motor Control System; R. J. Wensley, Pittsburgh, Pa. App. filed March 1, 1923.

New Trade Literature

LIGHTING FIXTURES. — A 32-page catalog, D-9, illustrating the Williamson line, a group of distinctive lighting fixtures obtainable from electrical supply jobbers, has recently been issued. The booklet gives interesting information and shows latest developments in the popular Williamson shaded light fixtures made by the Beardslee Chandelier Manufacturing Company, Chicago.

LIGHTING EQUIPMENT FOR AIRPORTS.—"Safe airport lighting" is the caption of a catalog recently issued by the B.B.T. Corporation of America. The catalog contains a comprehensive treatment of the important subject of the lighting of airports for night operation. Commencing with the principle of collection and projection of light through the Fresno lens, the catalog is amply illustrated both with diagrams and cuts showing the effect of lighting. It includes specifications for the various types of equipment for air mail landings and commercial flying and gives an outlined discussion of the required installation in each case.

FUEL-BURNING AND STEAM-GENERATING EQUIPMENT. — Combustion Engineering Corporation, New York, has issued a new and revised edition of general condensed catalog GC-5. This sixteen-page catalog illustrates and briefly describes the more important fuel-burning and steam-generating equipment manufactured by the Combustion Engineering Corporation. The last page gives a complete list of C-E products.

OIL-ELECTRIC RAIL CAR.—The "Oil-Electric Rail Car" is the title of folder D.M.F.5183 issued by the Westinghouse Electric & Manufacturing Company. This folder announces a new Diesel engine, weighing only 23 lb. per horsepower and admirably adapted for rail car application. The engine has been proved thoroughly in service and the fuel cost has been determined to be 75 per cent less than for the gas engine, even though the maintenance costs are approximately the same. The carbon monoxide content of the products of combustion is much less in the oil engine. The Westinghouse company lists two sizes of oil-electric power plants, namely, 300 hp. and 400 hp. This engine is of such size and weight that dual power plants may be installed, permitting the use of rail cars powered with 600-hp. and 800-hp. equipment.

Foreign Trade Opportunities

Following are listed opportunities to enter foreign markets. Further information can be obtained from the Bureau of Foreign and Domestic Commerce, Washington, by mentioning the number:

Agency and purchase are sought in Buenos Aires, Argentina (No. 41294), for dry batteries, flashlights and electric wiring supplies.

Agency is sought in Havana, Cuba (No. 41197), for commutator stones and cement and electrical maintenance tools.

Agency is sought in Buenos Aires, Argentina (No. 41269), for electric pneumatic portable drills.

Agency and purchase are sought in Addis Ababa, Ethiopia (No. 41207), for flashlights, batteries, battery supplies and farm-lighting plants.

Agency and purchase are desired in Toronto, Canada (No. 41245), for electric hand-drying machines.

Agency and purchase are sought in Prague, Czechoslovakia (No. 41295), for electrical household appliances.

Agency and purchase are sought in Moravska, Ostrava, Czechoslovakia (No. 41265), for household and hotel electrical appliances and electric refrigerators.

Agency is sought in Havana, Cuba (No. 41197), for electrical paint sprayers.

Agency is sought in Cardiff, Wales (No. 41246), for electric household refrigerators.

Agency and purchase are sought in Prague, Czechoslovakia (No. 41295), for industrial electric trucks.

Purchase is sought in Mukden, China (No. 41299), for portable wireless telegraph sets.

Business Facts for Electrical Men

Selected Statistics Presented Graphically for the Use of All Interested in Analyzing the Trend of the Electrical Business

Electricity in the Laundry

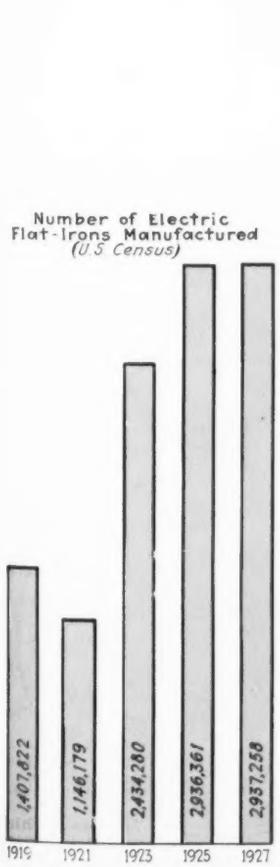
OF THE electric appliances in fairly common use three may be designated as laundry appliances: the flat-iron, the washer and the ironer. Only the first of these, however, has really become thoroughly introduced, for of the 19,000,000 homes having electric service at the beginning of 1929 17,700,000, or 93 per cent, had electric flat-irons, according to estimates published earlier in the year by *Electrical Merchandising*.

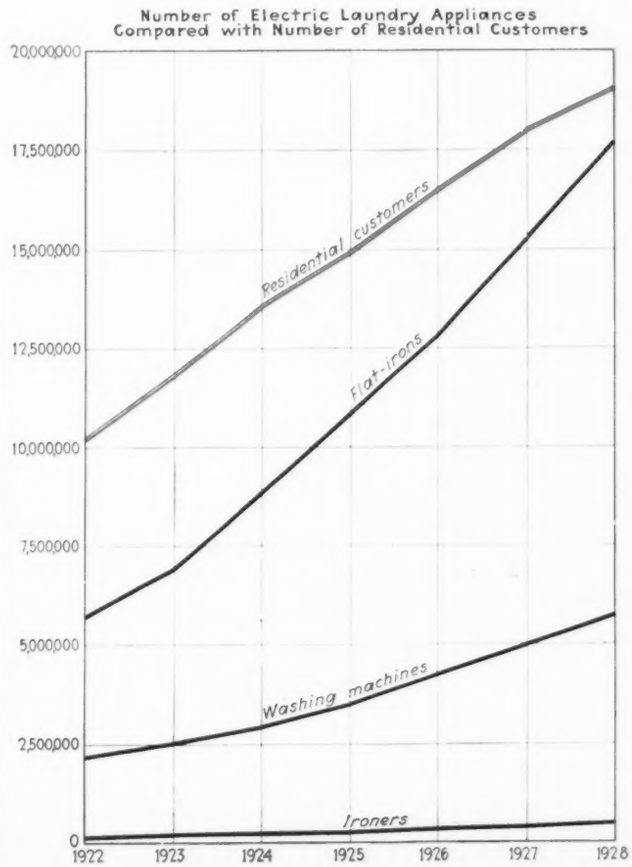
But this apparent trend toward what may seem like market saturation does not foreshadow a decrease in sales, while the growth of energy consumption will presumably continue for a number of years to come. For several years the production has been around 3,000,000 annually. With nearly 18,000,000 irons now in use, most of them no longer new, this production will in large measure be required for replacements alone.

Next in importance is the washing machine, of which appliance more than 800,000 were sold during 1928. The statistics have been published by *Electrical Merchandising*. Census data on production are not available. The number in use has been steadily increasing, and rose to 5,735,000 in 1928. While it is no doubt true that many families using electric light are not, under present conditions, prospective owners of washers, it is evident that there is still abundant room for growth, for of all the recurrent forms of household drudgery the "week's washing" is probably the most laborious, yet lending itself readily to the substitution of mechanical for human power. Notwithstanding possible alternatives, the solution in many cases will be the mechanization of this task, in the individual home. For the central station this will mean additional energy sales; for the appliance industry a market combining introductions and replacements.

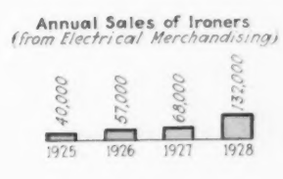
The third laundry device is the ironing machine. This is in use to the extent of 480,000 units. The sales are increasing year by year; in 1928 they were nearly twice as great as in 1927 and more than three times as great as in 1925.

Most of the data for statistics in the ELECTRICAL WORLD are gathered by it from original sources. Privilege is freely given to readers to quote or use them for any legitimate purpose. While no acknowledgment is required, users will, by crediting the ELECTRICAL WORLD, help it in obtaining and compiling further basic information.





The Use of Electric Laundry Appliances Is Increasing Rapidly



A Billion-Kilowatt-Hour Load

IN THESE days nearly everything we make, use, do, eat, wear and to a great extent even what we see and hear involves the use of electrical energy. So it is not surprising that the washing and ironing of our clothes should call for a quite appreciable block of power.

On the basis of statistics to which reference is made on the preceding page an estimate has been made of the energy consumed by household laundry appliances during the past few years.

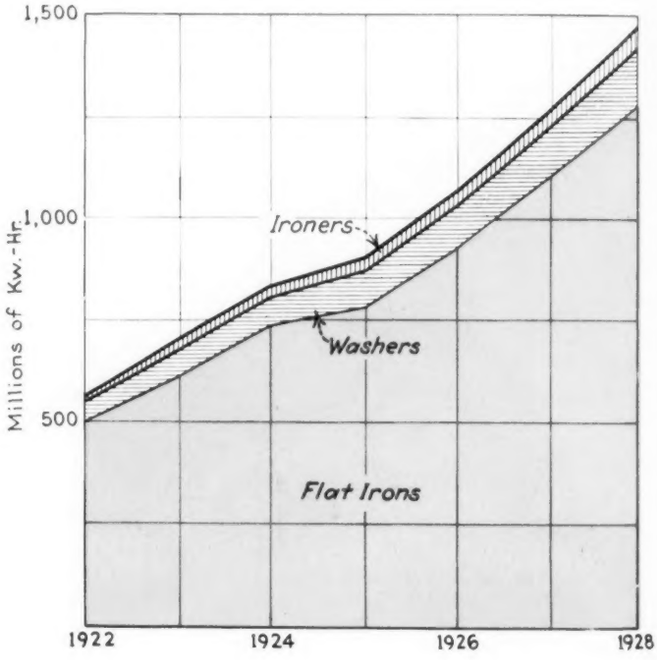
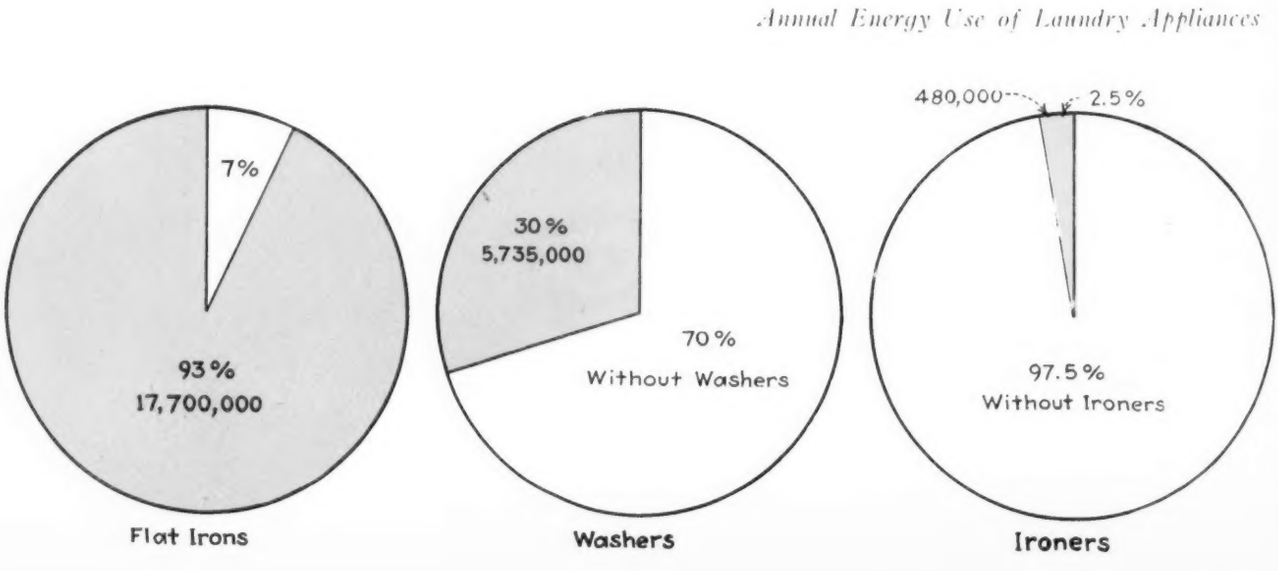
Assuming for flat-irons an average of 72 kw.-hr. per year, for washing machines 24 and for ironers 125, it appears that the first named used, during 1928, 1,275,000,000 kw.-hr., the second 137,000,000 and the third 52,000,000; the total is 1,464,000,000 kw.-hr. Probably there should be a deduction for appliances owned but not in regular use. Even if this is done, it is evident that the three devices consumed over 1.5 per cent of the total central station energy output, with the flat-iron taking the lion's share—a very large lion's. But the other two are by no means insignificant.

How much additional power equipment has all this required? The answer is difficult. In residential districts, where the evening lighting load establishes the peak, these appliances may not call for any additional investment whatever, whether in substations, distribution lines or transformers. In the generating stations, if the evening demand establishes the capacity, the same reasoning holds. If the day load determines it, as it does in certain industrial localities, then this added day load must add somewhat to the installation required to take care of it. There is no general answer. It depends on local conditions.

The further possibilities of increasing this type of load are evident from the diagram at the bottom of this page. Less than a third of the wired homes have washing machines; only 2.5 per cent have ironers.

Only an eighth of the energy for laundry operations now goes to washers and ironers (right).

Also, only 30 per cent of the 19,000,000 residential customers have washers and only 2.5 per cent have ironers (below).



Annual Energy Use of Laundry Appliances